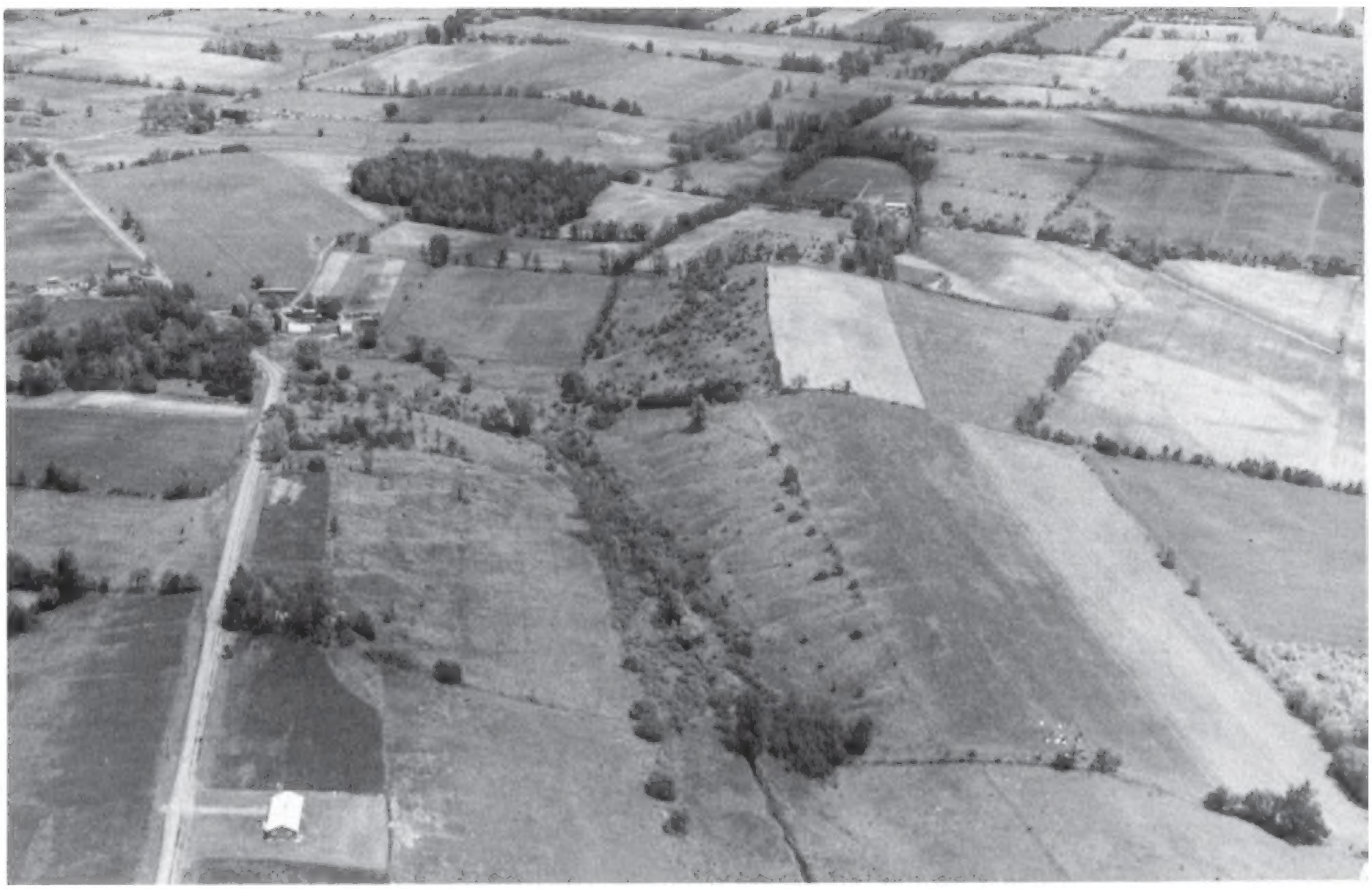
Issued March 1969

SOIL SURVEY

Genesee County, New York



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1951–63. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station as part of the assistance furnished to the Genesee County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Genesee County, N.Y., contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in judging the suitability of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Genesee County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described and the page for the capability unit in which the soil has been placed. It also lists the woodland suitability group of each soil.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitations or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the capability units and woodland groups.

Foresters and others can refer to the subsection "Use of Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the subsection "Wildlife."

Community planners and others concerned with areas of expanding industry and housing can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the subsection "Nonfarm Uses of Soils."

Engineers and builders will find under "Engineering Applications" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation, Morphology, and Classification of Soils."

Newcomers in Genesee County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County."

Cover picture.—Characteristic landscape in the Ontario-Hilton soil association, which is extensive across the northern part of the county. In the center of the picture are two drumlins and, between them, a nearly straight drainageway.

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SOIL SURVEY OF GENESEE COUNTY, NEW YORK

BY JOHN P. WULFORST, WILLIAM A. WERTZ, AND RICHARD P. LEONARD, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

GENESEE COUNTY is in the northwestern part of New York, about midway between Buffalo and Rochester (fig. 1). It lies about 25 miles south of Lake Ontario and about the same distance northeast of Lake Erie. The county is roughly rectangular in shape; it extends approximately 18 miles from north to south and 28 miles from east to west.

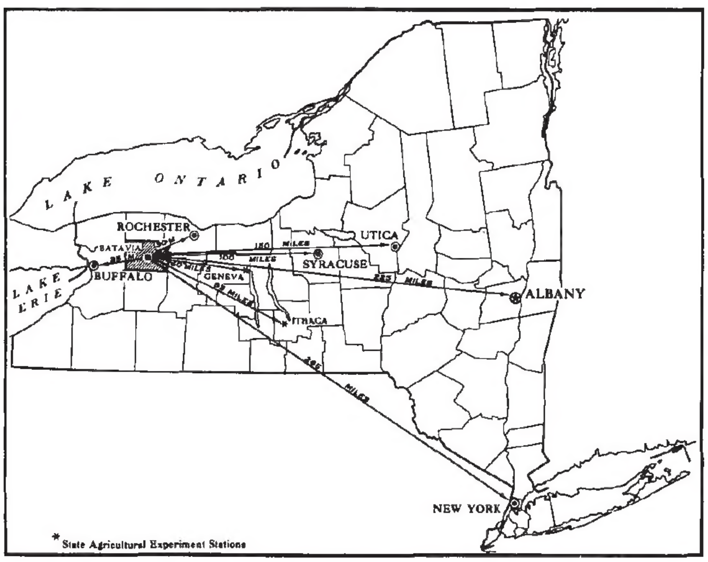

Figure 1.—**Location of Genesee County in New York.**

About three-fourths of the county is in farms, and about two-thirds of the farmland acreage is used for crops. Many of the farms are diversified, but others are used for dairying or the production of corn for grain, dry beans, and peas. Organic soils in the northern part of the county are used intensively for producing onions, potatoes, and other root and salad crops.

An estimated 25 percent of the county is wooded. Most of the woodland is scattered through the farming area but is of little importance to farm incomes. Some of it is owned by the State and the Federal governments. Among the government-owned forests are those of the New York State Conservation Department, the Iroquois Wildlife Refuge, and the Bergen Swamp Wildlife Sanctuary.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Genesee County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Lansing and Darien, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Palmyra gravelly loam and Palmyra shaly silt loam are two soil types in the Palmyra series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting

their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Ontario loam, 0 to 3 percent slopes, is one of several phases of Ontario loam, a soil type that ranges from nearly level to steep.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where two or more soils occur together without regularity in pattern and proportion. These soils are mapped together as one unit, called an undifferentiated mapping unit, because it is not practical to show them separately on the map. At least one of the component soils occurs in every delineated area. The soils of an undifferentiated unit are similar enough in behavior that their separation is not important for the objectives of the survey. An example of an undifferentiated unit is Galen and Minoa very fine sandy loams, 0 to 2 percent slopes.

In addition, on most soil maps, areas are shown in which the soil material is so rocky, so shallow, or so frequently worked by wind or water that it cannot be classified by soil series. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Alluvial land or Rockland, limestone, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Genesee County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

In Genesee County the major soils in eight of the eleven soil associations formed in glacial till. The major soils in one association formed in proglacial lacustrine deposits, those in one association formed in proglacial fluvial deposits, and those in one association consist of postglacial muck and peat.

The soils formed in glacial till are separated on the basis of color, carbonate content, and relief. The red soils of the Ontario-Hilton and the Cazenovia-Ovid associations developed in glacial till of the Hamburg-Marilla drift sheet, and they consistently reflect the red color and high carbonate content of this till. The difference between the dominant soils in the two associations is primarily one of relief, for the Ontario and Hilton soils occur in the drumlin area, and the Cazenovia and Ovid soils lie on the relatively mildly sloping, hummocky ground moraine.

The brown and gray soils of the Benson-Honeoye, Lansing-Conesus, Remsen-Darien, Fremont-Hornell-Manlius, Lima-Kendaia, and Mohawk-Manheim associations all developed in glacial till of the Valley Heads drift sheet. These soils consistently reflect the color and the carbonate and shale content of this till. Among the characteristics that differentiate the soils are depth to rock, carbonate content, shale content, and relief. It should be emphasized that some characteristics that justify the differentiation of soils do not justify the differentiation of parent material. Consequently, a given glacial deposit may be the parent material for soils in several associations.

A correlation of soil associations with physiographic provinces and glacial deposits is as follows:

	Soil association
A. Appalachian Uplands: Valley Heads drift sheet; noncalcareous glacial till.	Fremont-Hornell-Manlius.
B. Ontario Lowlands:	
1. Valley Heads drift sheet:	
Calcareous glacial till—	
More than 5 feet to bedrock	Lansing-Conesus, Remsen-Darien, Lima-Kendaia, and Mohawk-Manheim.
Less than 5 feet to limestone	Benson-Honeoye.
Glaciofluvial deposits	Palmyra.
2. Hamburg-Marilla drift sheet:	
Calcareous glacial till—	
In the ground moraine area	Cazenovia-Ovid.
In the drumlin area	Ontario-Hilton.
Glaciolacustrine deposits	Collamer-Galen-Canandaigua-Lamson.
3. Post-glacial deposits; muck and peat	Muck.

1. Ontario-Hilton Association

Deep, well drained and moderately well drained soils having a medium-textured subsoil

This association consists mainly of deep, medium-textured, high-lime soils that developed from reddish glacial till (fig. 2). It extends from the town of Alabama eastward, in a roughly broadening band, to the Monroe County line. In the central part it is made up dominantly of elongated hills, called drumlins, that range from 1/4 mile to 2 miles in length and from 200 feet to 1/2 mile in width (fig. 3). Near the edges it is gently rolling to undulating. It is the largest association in the county and occupies about 70,400 acres, or 22 percent of the county.

Dominant in the association are the Ontario and Hilton soils. The well-drained Ontario soils occur on the higher convex slopes and make up 50 percent of the total acreage. The moderately well drained Hilton soils generally occur on the nearly level or gently sloping side slopes, though in many areas these slopes are occupied by the Lima soils. Hilton soils and Lima soils account for 20 percent and 5 percent of the acreage, respectively. Also in the association are the Appleton and Lyons soils, which lie in low, wet areas and make up 20 percent of the acreage. Locally, there are areas of wetter soils that formed in lake-laid material, and these occupy 5 percent of the association.

The dominant soils are suited to many kinds of crops, including corn, field crops, and vegetables. Beets, snap beans, tomatoes, and cabbage are the major vegetable crops. Improved drainage is needed on the wetter soils, but if tile is laid, these soils produce as well as the drier

Figure 3.—An elongated hill, or drumlin, partly covered with trees. The drumlin was formed by glacial ice, and its longer axis extends in the direction that the ice moved.

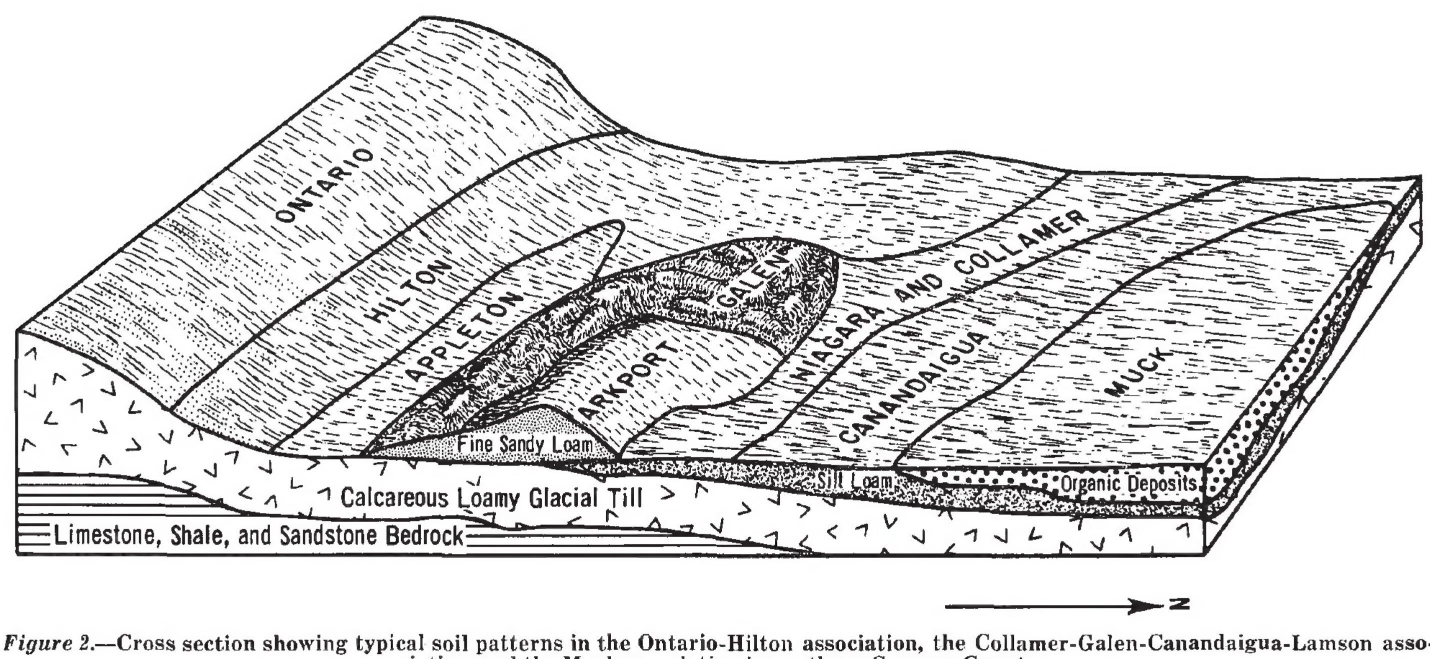

Figure 2.—Cross section showing typical soil patterns in the Ontario-Hilton association, the Collamer-Galen-Canandaigua-Lamson association, and the Muck association in northern Genesee County.

soils. Lime is needed in moderate amounts; the response of crops to fertilization is good. Some soils in this association can be cropped intensively.

The better drained soils provide dry sites for homes, but installing adequate wells and disposing of septic tank effluent are moderately difficult in areas where municipal facilities are not provided. Close investigation is necessary for locating the best sites.

2. Mohawk-Manheim Association

Deep, well-drained to somewhat poorly drained soils having a medium-textured subsoil, from shaly till

This association consists mainly of deep, medium-textured, high-lime soils that developed from shaly glacial till. Most of the acreage lies in a belt about 3 miles wide that extends from the city of Batavia west-southwestward to within a mile of the Erie County line. A smaller area occurs just southeast of Batavia. The landscape is a choppy pattern of knolls having short, gentle to steep side slopes, together with basins between the knolls (fig. 4). The association occupies about 26,000 acres, or 8 percent of the county.

The principal soils are the well drained or moderately well drained Mohawk soils and the moderately well drained or somewhat poorly drained Manheim soils. Mohawk soils are on the gentle to steep side slopes of knolls and make up 35 percent of the association. Manheim soils occupy gentle, more nearly uniform slopes and account for 30 percent of the association. In depressional areas are the poorly drained Ilion soils, which make up 10 percent of the total acreage, and the sandy Lamson soils, 5 percent. Scattered throughout the association are shaly moraines that contain the gravelly Palmyra or Phelps soils. These gravelly soils occupy about 20 percent of the acreage.

Farming on this association is fairly difficult because some of the short slopes are steep and the soils in many adjacent areas are too poorly drained. Consequently, producing crops in fields large enough to be farmed economically requires the use of practices that control erosion and that improve drainage in the same field. The soils are productive, however, and have high natural fertility.

Dairying is the main farm enterprise. In addition, dry beans and some other cash crops are grown. Most of the wetter areas are wooded or idle. The farms, except for a few, are smaller than the average-sized farm in the county.

The soils of the association vary in their suitability for nonfarm uses. On the Mohawk soils, some good dry sites are available but water is undependable and septic tanks are difficult to install. Locally, the gravelly Palmyra soils are well suited to use as house lots, but low areas surrounding the knolls are undesirable for housing. As a source of gravel, the Palmyra soils in this association are inferior because of the shale in the outwash.

3. Lima-Kendaia Association

Deep, moderately well drained and somewhat poorly drained soils having a medium-textured subsoil

This association is made up principally of deep and moderately deep, medium-textured, high-lime soils that developed on glacial till. It lies south of the limestone escarpment in the eastern half of the county. Most of the acreage is gently sloping or undulating, but extensive areas are nearly level. The association occupies about 26,200 acres, or 8 percent of the county.

Dominant are the Lima and Kendaia soils. The moderately well drained Lima soils, which cover 50 percent of the total acreage, are in nearly level and gently sloping areas that are wet for short periods in spring. The wetter Kendaia soils occur closely with the Lyons soils in flat or depressional areas. Soils of each series occupy about 15 percent of the acreage. The well-drained Ontario and Honeoye soils account for about 15 percent of the association. Locally, soils formed in lake-laid material are in wet areas, and these make up the remaining 5 percent.

Much of this association is used for general farming. In most places the soils require better drainage, but after they are drained, they are productive. Little lime is needed on many of the soils, except where legumes are

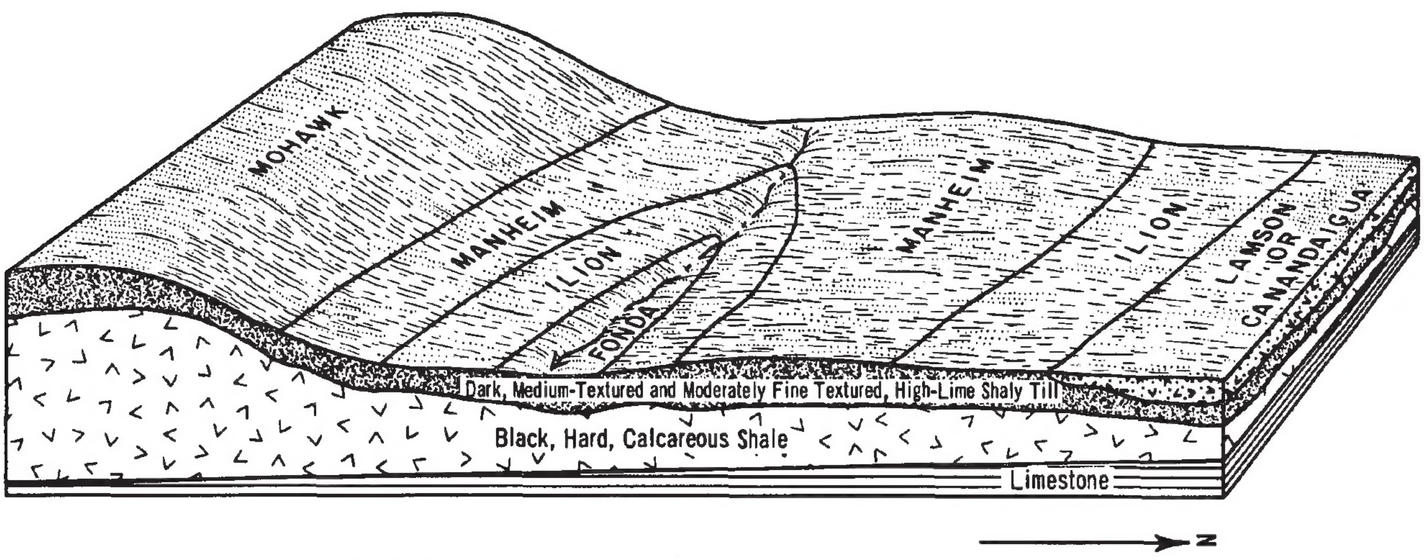

Figure 4.—Cross section showing typical soil pattern in the Mohawk-Manheim association.

grown. Phosphorus is deficient, and potassium is needed in fields that have been intensively farmed.

For nonfarm uses, the major limitation is a seasonally high water table. Selected areas make good sites for homes.

4. Cazenovia-Ovid Association

Deep, well-drained to somewhat poorly drained soils having a moderately fine textured subsoil

This association generally consists of reddish, moderately fine textured and fine textured, high-lime soils that developed mainly on glacial till. It occupies two areas in Genesee County. One area, about 2 miles wide and 5 miles long, extends from Horseshoe Lake northeastward along both sides of Black Creek. The other, also about 2 miles wide, lies just north of the Onondaga limestone escarpment (fig. 5) and extends from the village of Oakfield westward to the Tonawanda Indian Reservation. Slopes are gently undulating to rolling, and the steepest ones are adjacent to Black Creek. This association occupies about 23,700 acres, or about 7 percent of the county.

The Cazenovia and Ovid soils are dominant. About 30 percent of the association is made up of well drained and moderately well drained Cazenovia soils. These have gentle to strong, convex slopes. About 30 percent of the association consists of somewhat poorly drained, gently sloping and nearly level Ovid soils. In low areas there are the poorly drained Romulus or Lakemont soils, which together occupy 10 percent of the total acreage. Near Horseshoe Lake are areas of fine-textured Schoharie soils. These formed in material laid down in lakes. They occupy 10 percent of the acreage, and so do the wetter Odessa soils, which lie west of Oakfield. Small areas of Ontario soils and Hilton soils make up the remaining 10 percent of the association.

Dairying and cash cropping are the main farm enterprises. The better farms are similar to those on the Ontario-Hilton association. Nevertheless, because the soils generally are finer textured and more poorly drained, they are suited to fewer kinds of crops and are less easily tilled than the soils in the Ontario-Hilton association.

The Ovid, Odessa, and other wetter soils have drainage limitations that affect alfalfa and other deep-rooted crops. Under good management, however, they produce favorable yields because they are fertile and contain a good supply of lime and potassium.

For nonfarm uses, a serious limitation is the clayey subsoil in the soils of this association. Generally, the infiltration rate is very slow, especially in the Schoharie and Odessa soils. Consequently, installing facilities for the disposal of sewage is expensive.

5. Benson-Honeoye, Moderately Deep, Association

Shallow and moderately deep, well-drained soils having a medium-textured subsoil, over limestone bedrock

This association is made up chiefly of shallow and moderately deep, medium-textured, high-lime soils that developed in glacial till over limestone. It forms an irregularly shaped, discontinuous band running east and west through the center of the county. The largest area is in the town of Le Roy. A prominent feature is the Onondaga limestone escarpment (fig. 6), which faces north and is generally steep. (See also fig. 5.) Soils north of the escarpment are gently sloping or moderately sloping, and those south of it are nearly level or gently sloping. Limestone crops out in many places. The association occupies about 19,200 acres, or 6 percent of the county.

Dominant are the Benson soils and a moderately deep variant from the normal Honeoye soils. All of these are well drained. The shallow, nearly level to very steep Benson soils occupy 55 percent of the association. The moderately deep, gently sloping Honeoye soil occupies 25 percent. About 15 percent of the acreage consists of the

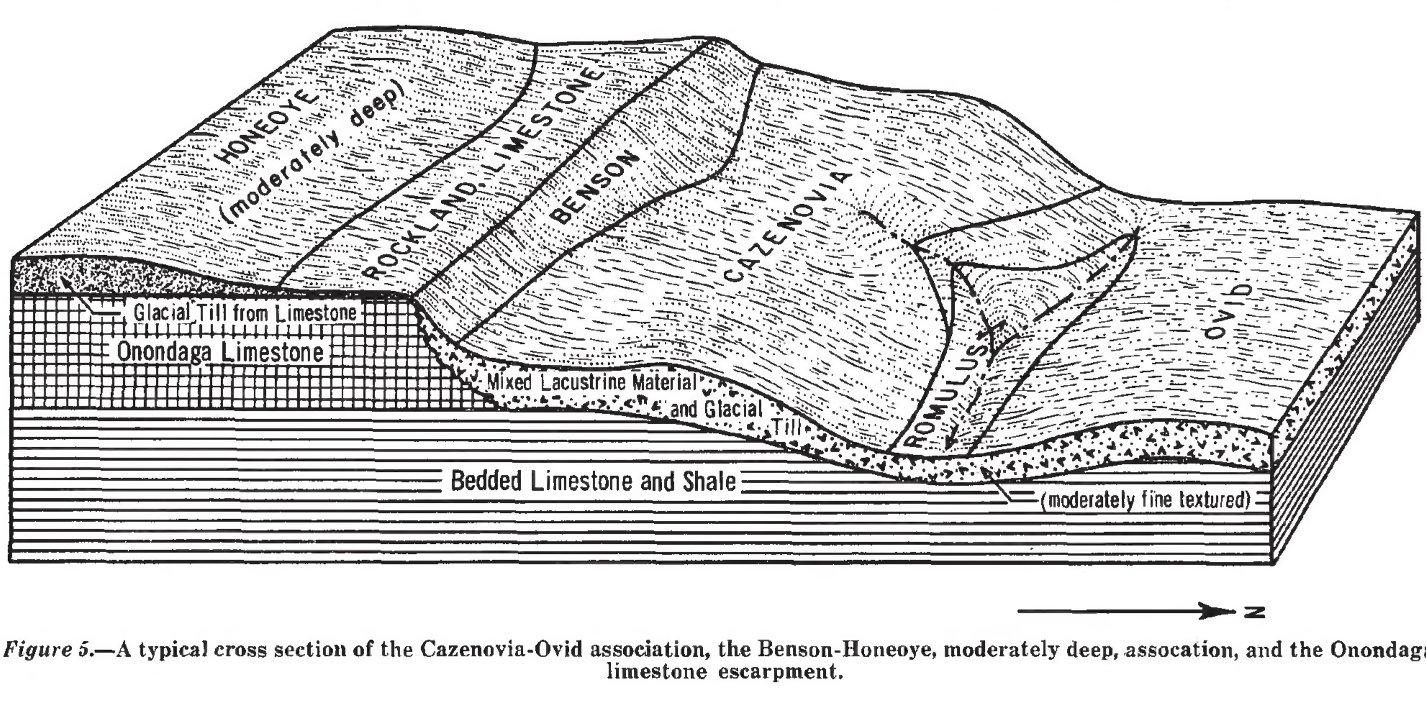

Figure 5.—**A typical cross section of the Cazenovia-Ovid association, the Benson-Honeoye, moderately deep, assocation, and the Onondaga limestone escarpment.**

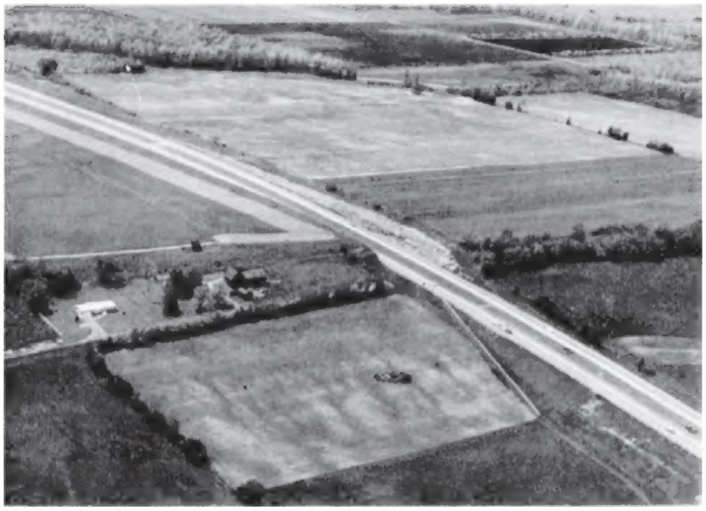

Figure 6.—**Aerial view of the New York State Thruway cut into the Onondaga limestone escarpment. Soils ahead of the escarpment are gently sloping or moderately sloping (foreground); those on it are generally steep; and those behind it are nearly level or gently sloping.**

land type, Rockland, limestone, and a few small areas consist of the deep Ontario soils and the moderately deep Lima soils. These minor soils account for the remaining 5 percent of the acreage.

Some farming of the general type is carried on where the farms are made up largely of the moderately deep Honeoye soil. This soil is not so droughty as the Benson soils or rockland areas, and it is well suited to crops planted early in spring. Areas that are dominantly Rockland, limestone, are unsuitable for cultivation. Most of these areas occur near the village of Le Roy, where quarrying is extensive.

Nonfarm uses are limited mainly because the soils in this association are shallow or only moderately deep to limestone bedrock.

6. Lansing-Conesus Association

Deep, well drained and moderately well drained soils having a medium-textured subsoil

This association is made up chiefly of deep, well drained and moderately well drained, medium-textured, medium-lime soils that developed from grayish glacial till. It occurs on the highlands in the southeastern part of the county. Here, it adjoins the Lima-Kendaia association near U.S. Highway 20 and extends southward to the Wyoming County line and westward to the hamlet of Linden. The association occupies about 17,300 acres, or 6 percent of the county.

The soils that make up this association generally are the steepest and have the longest slopes of any in the county (fig. 7). Dominant are the well drained Lansing soils and the moderately well drained Conesus soils. The Lansing soils lie in convex areas and account for 40 per-

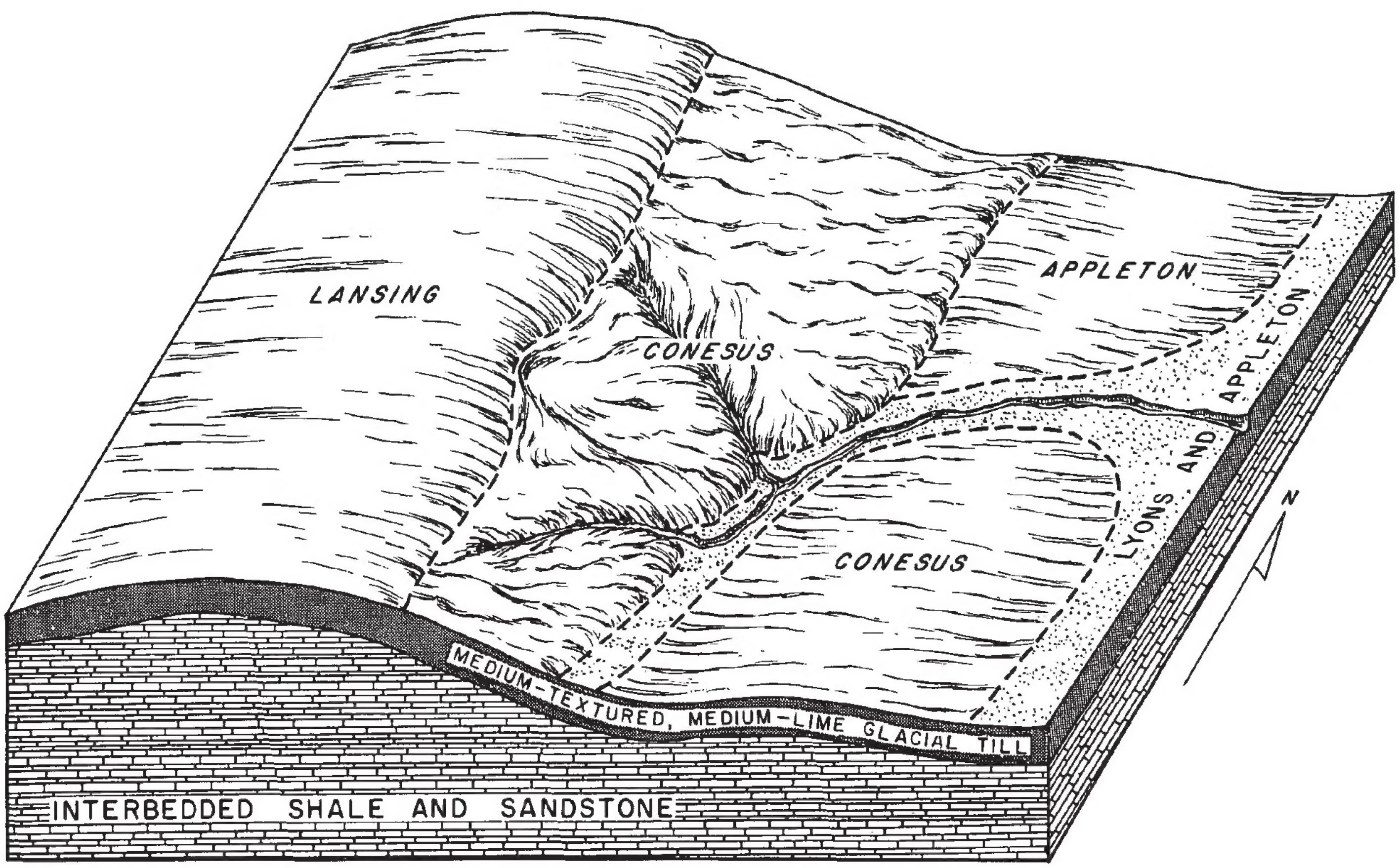

Figure 7.—Cross section showing typical soil pattern in the Lansing-Conesus association.

cent of the total acreage. The Conesus soils occur in less sloping areas that are wet for short periods; they occupy 30 percent of the acreage. In nearly level areas that remain wet for considerably longer periods are the somewhat poorly drained Appleton soils or the poorly drained Lyons soils. The soils of each series account for 10 percent of the association. Small areas of poorly drained soils formed in lacustrine sediments occupy the remaining 10 percent.

Although the growing season is somewhat shorter on this association than it is on similar soils farther north, most crops grown locally are well suited to the dominant soils. These crops include corn, small grain, hay, and dry beans. Liberal amounts of lime and fertilizer are needed, but crop response is good. Artificial drainage and measures for controlling erosion are needed on most farms.

The better drained soils provide dry sites for homes, but obtaining water for domestic use and disposing of septic tank effluent are moderately difficult in places where municipal facilities are not provided. Close investigation is necessary for locating the best sites. Wells that produce natural gas are active on this association.

7. Remsen-Darien Association

Deep, somewhat poorly drained soils having a fine textured and moderately fine textured subsoil

This association consists mainly of somewhat poorly drained, medium-lime, clayey soils that developed from gray, shaly glacial till. It lies in a belt 2 to 6 miles wide that extends along the northern edge of the Allegheny Plateau from Texaco Town westward but is bisected by the valley of Tonawanda Creek. In most places the slopes are gently or moderately undulating, though steep north-facing slopes occur toward the south. The association occupies about 32,000 acres, or 10 percent of the county.

The principal soils are the gently sloping to steep Remsen and Darien soils. These soils all have a fine textured and moderately fine textured subsoil. The Remsen soils cover 40 percent of the total acreage, and the Darien soils cover 25 percent. In low areas where water accumulates are the poorly drained Ilion and Madalin soils, which occupy 20 percent of the association. Near Texaco Town there are many small areas of Nunda and Burdett soils. These soils, together with the Fonda, Mohawk, and Manheim soils, make up the remaining 15 percent of the association.

The soils in this association are used principally for crops grown in support of dairying. Wheat is productive, and water-tolerant legumes are widely used. The soils are difficult to till, are in physically poor condition, and are difficult to drain. Consequently, the acreage of grassland farming is increasing.

These soils have limitations that seriously affect nonfarm uses. Their subsoil is nearly impermeable to water, and the clay is unstable when wet. Some areas have been set aside for recreation.

8. Fremont-Hornell-Manlius Association

Deep and moderately deep, well-drained to somewhat poorly drained soils having a medium-textured and fine-textured subsoil, from shaly till

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This association generally consists of well-drained to somewhat poorly drained, acid soils that developed from shaly glacial till (fig. 8). It occupies the highest part of the Allegheny Plateau in Genesee County. From the hamlet of Linden the association extends westward along the Wyoming County line, but near the village of Attica it is divided into three areas by major valleys. It covers a total of about 16,000 acres, or about 5 percent of the county.

Dominant are the Fremont, Hornell, and Manlius soils, all of which are strongly acid. They occupy nearly level to steep side slopes that do not accumulate runoff from adjacent areas. The somewhat poorly drained, moderately fine textured Fremont soils account for 25 percent of the total acreage; the moderately well drained or somewhat poorly drained, fine-textured Hornell soils, 20 percent; and the well-drained, shaly Manlius soils, 15 percent.

In addition, about 15 percent of the association is made up of moderately well drained, shaly Marilla soils, and 10 percent consists of gravelly, shaly Chenango soils. Also in the association are poorly drained Allis soils, which lie in low areas where water accumulates. They account for most of the remaining 15 percent.

Dairying is the principal type of farming. Lime and fertilizer are needed in exceptionally large amounts, for the soils have the lowest natural fertility of any soils in the county. Moreover, they may be difficult to drain because their subsoil is slowly permeable in some places. The soils are poorly suited to crops, and many fields have been abandoned.

Some good sites for homes occur in scattered areas of shaly gravel, though the gravel is inferior for use in constructing roads. In recent years many summer homes have been built, together with ponds and tree plantations. This trend is likely to continue.

9. Palmyra Association

Deep, well-drained, high-lime soils having a medium-textured subsoil, over sand and gravel

This association is made up chiefly of well-drained, gravelly soils on glacial outwash terraces and of loamy soils on flood plains (fig. 9). It occurs in the southern half of the county, where outwash terraces and the adjacent first bottoms along the major streams are most extensive. In these places there is a considerable difference in elevation between the valley floor and the nearby uplands. The largest area of glacial terraces in the county extends along the east side of the Tonawanda Creek valley from Batavia to Attica. A smaller area lies just north of the hamlet of Bushville. This association occupies 30,140 acres, or about 10 percent of the county.

Dominant on the terraces are the gravelly, well-drained Palmyra soils. In addition, there are smaller areas of Phelps, Fredon, Halsey, and Arkport soils. These soils on terraces together make up 65 percent of the total acreage. On the adjacent bottom land are the Genesee, Eel, Wayland, and other alluvial soils. These occupy 20 percent of the association. In the beds of old glacial lakes, the most common soils are the more clayey Rhinebeck and Madalin soils, and these make up 15 percent of the association.

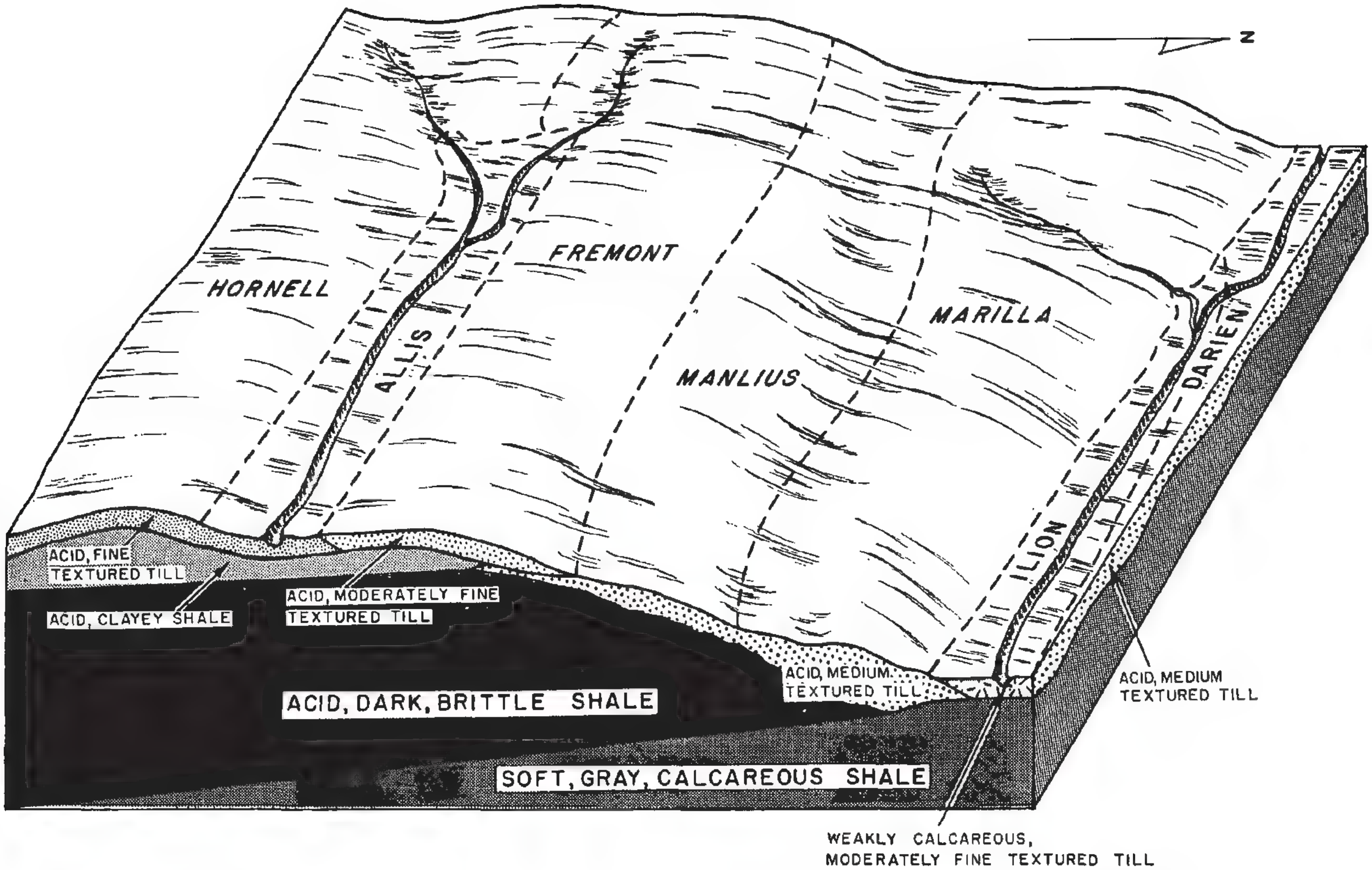

Figure 8.—Cross section showing typical soil pattern in the Fremont Hornell-Manlius association.

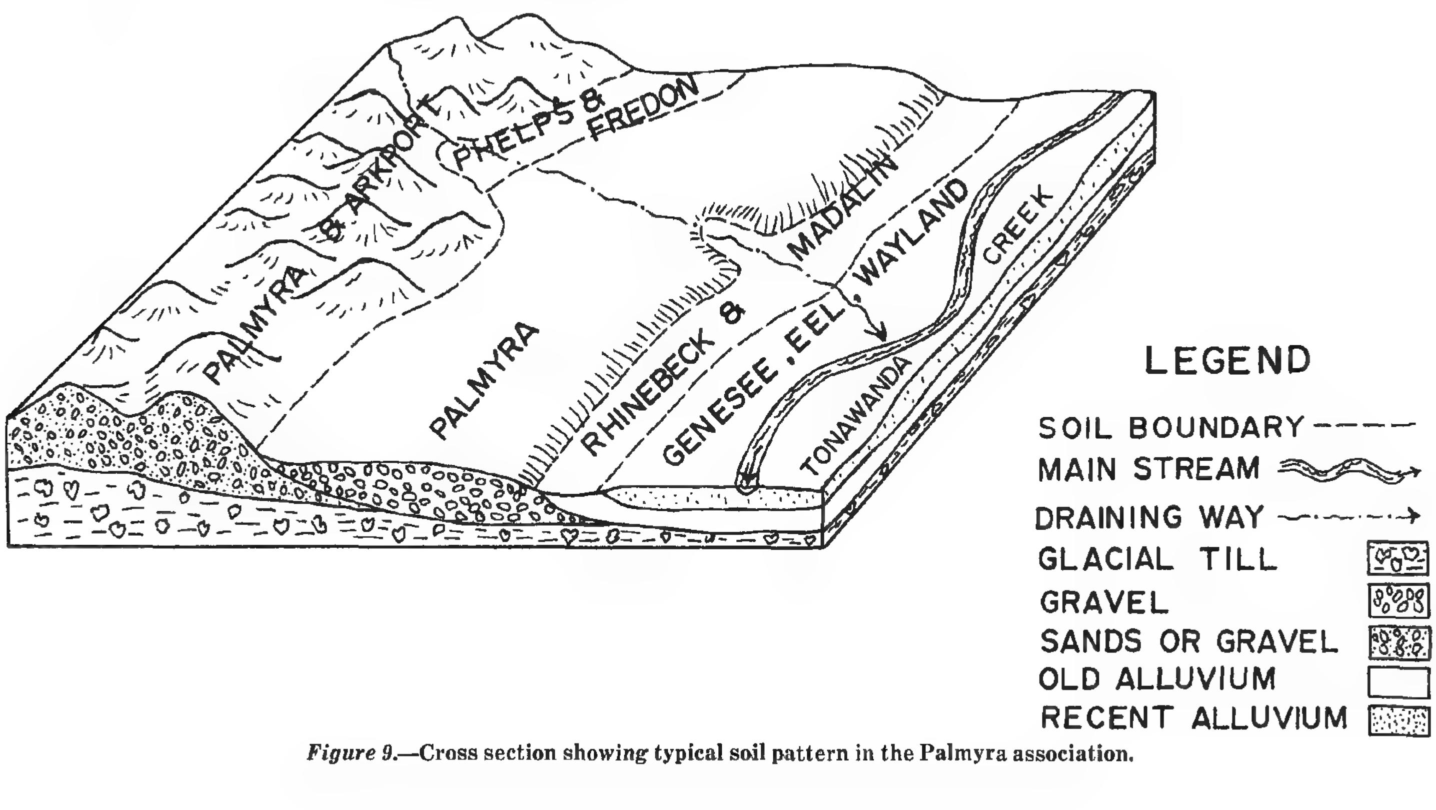

Figure 9.—Cross section showing typical soil pattern in the Palmyra association.

In areas having favorable slopes, the soils on terraces are excellent for farming, and so are the Genesee and Eel soils on the flood plains. They are fertile and highly productive. In contrast, the soils in wet lakebeds and those on very steep terraces are poor for farming. Flooding is a hazard on the bottom land.

Nonfarm uses of soils on the bottom land are seriously limited by the risk of flooding. The adjacent terraces offer many excellent sites for homes or industrial plants. Water is available from underground sources, and the soils are sufficiently permeable for disposing of septic tank effluent. Gravelly material needed in construction can be obtained in most places.

10. Collamer-Galen-Canandaigua-Lamson Association

Deep, moderately well drained to poorly drained, medium- and high-lime soils having a moderately coarse textured and medium-textured subsoil

This association consists mainly of moderately well drained to poorly drained, loamy and sandy soils that developed in lacustrine sediments. (See fig. 2, p. 3.) It is most extensive in the northwestern part of the county. The soils generally are nearly level or gently sloping, but some steep kamelike areas are scattered throughout. The association occupies about 43,000 acres, or 13 percent of the county.

Dominant are the Collamer, Galen, Canandaigua, and Lamson soils. The moderately well drained, loamy Collamer soils and sandy Galen soils make up about 30 percent of the total acreage. The poorly drained Canandaigua and Lamson soils account for 25 percent. Also in the association are the gently sloping to steep, well-drained Arkport, Colonie, and Dunkirk soils, and these occupy 20 percent of the acreage. The remaining 25 percent consists of the Odessa and Hilton soils, as well as the Niagara, Minoa, and Stafford soils.

The suitability of these soils for farming varies widely within short distances. Some excellent farms occur in areas where slopes are favorable and where drainage generally is good or moderately good. Nearby, however, are farms that are in various stages of abandonment because they lie in low, wet areas that are difficult to drain.

Limitations on nonfarm uses of these soils are variable. Stability limits use for large structures. Generally, the Arkport and Colonie soils are most suitable as homesites.

11. Muck Association

Deep to shallow, very poorly drained organic soils

Various organic soils and soil materials are dominant in this association. (See fig. 2, p. 3.) Most of the acreage occurs along the Orleans County line. Oak Orchard Swamp occupies a large area, and smaller areas are in the Bergen, Pembroke, and Batavia Swamps. The association covers about 16,700 acres, or 5 percent of the county.

About 40 percent of the association consists of the land type Muck, shallow, and 30 percent consists of the land type Muck, deep. These areas make up most of the muck that has been cleared and is now cultivated (fig. 10). About 20 percent of the association is made up of poorly drained and very poorly drained mineral soils. These soils lie mainly in the west end of the Oak Orchard Swamp and along the edges of Muck, deep. The remaining 10 percent consists of Warners and Edwards soils, which occur chiefly in the Bergen Swamp.

Onions are the principal crop grown in cleared areas of muck. Also grown are potatoes, carrots, and salad crops. Owing to subsidence of the muck, improved drainage is needed in some areas.

The Bergen Swamp and most of the west end of the Oak Orchard Swamp are used as wildlife refuges or sanctuaries.

Use and Management of the Soils

The first part of this section discusses the general management of soils used for farming in Genesee County. The second part explains how soils are grouped according to their capability and describes the capability units in the county. In the third part, estimated acre yields are given for the principal crops under two levels of management. Next are discussions on the use of soils as woodland, for wildlife, and in engineering. Finally, there is a part that gives information about the nonfarm uses of soils.

General Management for Farming [1]

This subsection is designed to help farmers, and those who advise farmers, to choose some of the soil- and crop-management practices that are suitable for the wise and economic use of the soils on a farm and are appropriate for conditions prevailing at the time the choices are made. The user of this soil survey should modify his choices to take advantage of rapid advances in knowledge of soil and crop management resulting from agricultural research during the 1950-65 period, as well as advances anticipated in the future.

New research findings are reported currently in annually revised editions of "Cornell Recommends for Field Crops" and "Cornell Recommends for Vegetable Crops." Cornell Miscellaneous Bulletin Number 47 and current editions of other applicable publications on soil and crop management should also be consulted. A great body of constantly revised but unpublished information is available upon request from Genesee County agricultural agents and from soil conservationists of the Soil Conservation Service, who assist the Genesee County Soil Conservation District. Currently applicable information concerning soil and crop management is also available to the user of this survey from industry representatives who serve the farmers of Genesee County.

Acidity relationships of the soils

The natural lime content of Genesee County soils ranges from very low to high. Figure 11 illustrates the relationship of the different lime levels to a depth of 60 inches in four different profiles. The general soil map at

[1] This subsection prepared by REESHON FEUER, associate professor of agronomy, Cornell University. Unless otherwise noted, the material is based on the results of research studies performed on the Aurora and Mount Pleasant Research Farms by staff members and associates of the New York State College of Agriculture at Cornell University.

Figure 10.—Aerial view of Muck, deep, and Muck, shallow, that are used for cultivated crops. The darker areas consist of deep muck, and the lighter colored areas are shallow muck.

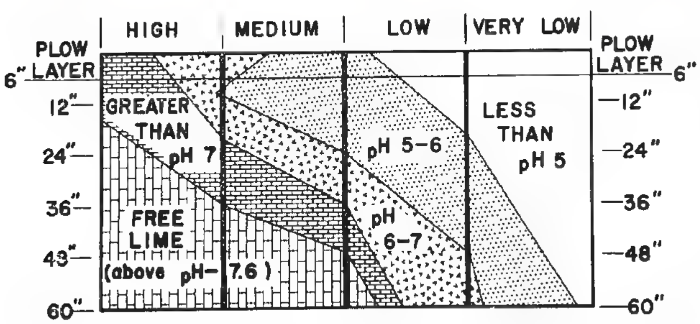

Figure 11.—Lime level of different soil profiles in Genesee County.

the back of this survey shows areas of high-lime, medium-lime, and low-lime soils in the county.

High-lime soils, such as the Honeoye, Mohawk, and Cazenovia soils, are neutral or slightly acid in the upper part but show an increase in pH with increasing depth. They generally have free lime at a depth of 16 to 30 inches. Medium-lime soils, such as the Lansing and Conesus, are strongly acid to a depth of more than 12 inches, but they are less acid with increasing depth. Free lime generally occurs below a depth of 30 to 40 inches. Low-lime soils, such as the Manlius and Marilla, are very strongly acid to a depth of more than 24 inches but may have neutral material deep in the substratum, commonly beyond the reach of plant roots.

In a soil having a surface layer of silt loam, the most common surface-layer texture in the county, lime moves downward at an average rate of about one-half inch per year. Also, lime is removed by crops in considerable amounts. Therefore, applying lime periodically, usually once each rotation sequence, is necessary for maintaining the desired pH in the plow layer of low-lime and medium-lime soils and, in some places, high-lime soils.

Subsoil characteristics affecting root growth

In choosing the crops to be grown on a given soil, the characteristics of the subsoil should be considered. Some soils, such as the Mohawk and Palmyra, have a subsoil that is easily penetrated by roots, and crops grown on these soils can send their roots to a great depth. Other soils, such as the Remsen, Benson, and Marilla, contain rock fragments, a fragipan, or a layer of heavy clay in their subsoil, and this characteristic inhibits root growth. Nearly all the high-lime and medium-lime soils have blocky structure in the subsoil. Crops can root deeply in these soils if drainage is good. Tile drainage is effective in moderately well drained to very poorly drained, medium-textured soils that have blocky structure in the subsoil. Open-ditch drainage is more effective in soils having a fine-textured subsoil. Figure 12 shows the effect of soil drainage on root development.

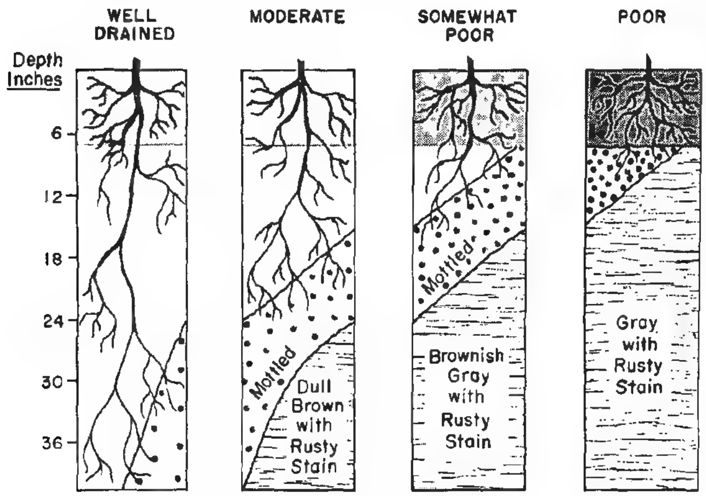

Figure 12.—**Effect of soil drainage on root development.**

Nitrogen relationships of the soils

The average organic-matter content in the surface layer of soils on uplands in the county is 3.5 percent. This percentage was obtained from soil test data. Nitrogen is released from this organic matter at a rate of 40 to about 160 pounds per acre per year.

Phosphorus relationships of the soils

Most soils in the county are naturally somewhat low in ability to supply phosphorus, and the addition of appropriate amounts of phosphate in the form of commercial fertilizers is essential for good crop growth. The moderately fine textured and fine textured soils have moderate phosphorus-supplying power. This means that they can release the equivalent of 20 to 25 pounds of phosphate annually. The medium-textured soils have low phosphorus-supplying power. This is equivalent to a release of about 10 pounds of phosphate per year.

Potassium relationships of the soils (4) [2]

The soils of this county generally have a very large total reserve of potassium, most of which is held in the clay (illite or vermiculite) particles. Clayey soils, such as those in the Odessa series, contain 40,000 to 50,000 pounds per acre of total potassium in the plow layer. Such soils have very high potassium-supplying power.

Medium-textured soils having an accumulation of clay in the subsoil, such as the Honeoye, Ontario, and Lansing soils, have high potassium-supplying power. This has been confirmed by extensive research trials on Honeoye, Lima, and Kendaia soils at the Aurora Research Farm in Cayuga County.

In the section "Descriptions of the Soils," the soils in each series in the county are rated according to their potassium-supplying power. The ratings are expressed in relative terms: high, medium, and low. Soils given a *high* rating supply the equivalent of 120 pounds or more of potash per year. Soils rated *medium* supply the equivalent of about 70 pounds of potash per year, and soils rated *low* supply less than 70 pounds.

Crop adaption relationships of the soils

Information about grain crops and perennial forage crops adapted to the soils of Genesee County is revised annually in the "Cornell Recommends" publications prepared by the staff of the New York State College of Agriculture at Cornell University. These publications are designed to keep New York farmers and those who advise farmers abreast of the latest applicable research findings in soil and crop management. The user of this soil survey is strongly urged to use current editions of these publications.

Capability Groups of Soils

Capability classification is a grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops, or to rice and other crops that have their own special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. Classes are defined as follows:

- Class I. Soils have few limitations that restrict their use (fig. 13).
- Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.
- Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

[2] Italic numbers in parentheses refer to Literature Cited, p. 177.

***Figure 13*—Soils in capability class I planted to corn. These soils have few restrictions that limit their use, and they can be cropped to corn several years in the rotation.**

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Class VI. Soils have severe limitations that generally make them unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in Genesee County, shows that the chief limitation is climate that is too cold or too dry.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about the management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIe-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages the capability units of Genesee County are described and suggestions for the use and management of the soils are given. Discussed for each unit are the characteristics of the soils in the unit, the suitability of these soils for crops, and the management suitable for the soils. To find the names of the soils in any given unit, refer to the "Guide to Mapping Units" at the back of this soil survey.

CAPABILITY UNIT I-1

Only Genesee silt loam is in this unit. This deep, medium-textured soil occupies well-drained flood plains. It is the most productive soil in the county. It has very high moisture-supplying capacity and moderate to high natural fertility. Although flooding occurs infrequently during the growing season, the risk of damage is only slight.

This soil is well suited to most crops grown in the county. It is especially well suited to row crops. Generally, the soil is more valuable for intertilled crops than it is for pasture or trees.

Row crops can be grown continuously if management is highly skilled. Also well suited are deep- and shallow-rooted sod crops. Among the practices needed are liming and fertilizing according to soil tests and desired yields, as well as minimum tillage of row crops. For maintaining good soil structure, residue management is important in cropping systems that include few or no sod crops. Streambank protection and channel improvement are desirable supporting measures. Diking to prevent overflow is needed in some places.

CAPABILITY UNIT I-2

This unit consists of deep, nearly level, well-drained soils on glacial outwash terraces and uplands. These soils are of the Chenango, Ontario, and Palmyra series. Their surface layer is medium textured, and in the Chenango and Palmyra soils, it is shaly or gravelly. Except for the Chenango soil, which is much more acid than the others, the soils in this unit contain lime and have moderate to high natural fertility. Permeability ranges from moderate to rapid, and the water-holding capacity from moderate to high. Erosion is not a hazard.

The soils of this unit are suited to practically all crops grown in the county, especially the deep-rooted ones. Good tilth is easily maintained. Generally, the soils are more valuable for rotation crops than for permanent pasture or woodland. In fields used for pasture, grazing can be started early in spring.

These soils are well suited to all grains and sod crops; they can be row cropped year after year under highly skilled management. Applying lime and fertilizer according to soil tests and the desired yield is essential. In addition, cover crops, minimum tillage of row crops, and residue management are needed for satisfactory yields and maintenance of favorable soil structure. Irrigation may be desirable, especially if shallow-rooted crops are grown.

CAPABILITY UNIT IIe-1

In this unit are gently sloping, medium-textured soils of the uplands. These soils are of the Honeoye, Lansing, Mohawk, and Ontario series. They developed on firm, calcareous glacial till, and they contain lime. Drainage generally is good, but it is only moderately good in some areas. Although bedrock ordinarily occurs at a depth of more than 40 inches, it is between 20 and 40 inches from the surface in the Honeoye and Mohawk soils. Natural fertility is high to moderate. The moisture-supplying capacity is high, except in areas of Honeoye and Mohawk soils that are less than 24 inches deep to bedrock. Permeability is moderate in the root zone but is slow in the firm till below it. Runoff is medium, and the hazard of erosion is moderate.

The soils in this unit are among the better soils for farming in the county. They are fairly easily kept in good tilth and can be used for crops, pasture, or woodland. Practically all crops common in the county are suited to these soils, though potatoes grown on the Honeoye and Mohawk soils are susceptible to corky scab, a bacterial disease, because of high pH. Fields in pasture can be safely grazed early in spring.

A suitable cropping system generally includes grasses and legumes. Unless the practices used for controlling erosion are adequate, the most intensive rotation that is suitable consists of 1 year of a row crop, 1 year of a small grain, and 1 year of hay. Wherever possible, tillage should be on the contour. Depending on the length of slope and the cropping system desired, contour stripcropping and diversion terraces may be needed.

Although these soils contain lime, they should be limed and fertilized according to soil tests and the needs of the crop to be grown. If few sod crops are used in rotations, minimum tillage and residue management are important in maintaining good soil structure.

CAPABILITY UNIT IIe-2

This unit consists of gently sloping, medium-textured, shaly or gravelly soils that are deep and well drained. These soils occupy glacial outwash terraces and are of the Chenango and Palmyra series. The Palmyra soils contain lime and have moderate to high natural fertility. The Chenango soil is strongly acid and low in natural fertility. Permeability of all the soils is moderate in the surface layer and subsoil but is very rapid in the gravelly substratum. The moisture-supplying capacity is moderate. Runoff is slow and causes a slight hazard of erosion.

These soils are suited to about the same kinds of crops as the soils in unit I-2. They are easy to keep in good tilth. If practices are not used for controlling erosion, the maximum intensity of cropping should not be more than 3 years of row crops, followed by 1 year of a small grain and 1 year of hay. To conserve moisture, contour tillage or contour stripcropping should be used wherever possible, but these practices are impractical in many places because of complex slopes. An added practice for conserving moisture and controlling erosion is crop residue management, which can be used to supplement other practices in fields where more intensive cropping is desired.

CAPABILITY UNIT IIe-3

In this unit are deep, gently sloping, medium-textured and moderately coarse textured, well-drained soils that occur in ancient lakebeds. These soils are of the Arkport and Dunkirk series and have low to moderate natural fertility. The moisture-supplying capacity ranges from moderate to high and is lowest in the Arkport soil. Erosion is a hazard.

The soils of this unit are well suited as cropland, pasture, or woodland. They are desirable for those crops whose harvesting requires a stone-free soil. Most crops grown in the county do well, especially truck crops. Where feasible, however, deep-rooted forage crops should be favored. Mismanaging the Dunkirk soil is likely to cause surface crusting and formation of a plowpan.

In reducing runoff and controlling erosion, contour tillage and contour stripcropping are effective. Where the soils are cropped intensively, terracing may be desirable. Existing waterways should be left in sod. In addition, adequate amounts of lime and fertilizer are needed to maintain productivity.

Minimum tillage of row crops, residue management, and the use of cover crops help to preserve good structure in the soil, especially if the cropping system includes a sod crop only a small part of the time. To assure satisfactory growth of truck crops, irrigation may be needed in dry years.

CAPABILITY UNIT IIe-4

This unit consists of deep, gently sloping, moderately well drained soils that occupy uplands or gravelly outwash terraces. These soils are of the Conesus, Hilton, Lima, Marilla, and Phelps series. They have a medium-textured surface layer, and this layer is shaly in the Marilla soil and gravelly in the Phelps soil.

Drainage is impeded in all soils of the unit because the subsoil or the substratum is dense and slowly permeable or, in the Phelps soil, because the water table is seasonally high. Consequently, slight wetness may delay planting briefly in spring. Erosion is a moderate hazard. The moisture-supplying capacity ranges from moderate to high. The Lima soil is high in natural fertility and in lime content, whereas the Conesus and Hilton soils have only medium fertility and lime content. Natural fertility is medium to low in the strongly acid Marilla soil.

The soils of this unit are well suited to crops, pasture plants, or trees. If practices are not used for controlling erosion, the maximum intensity of cropping should not be more than 1 year of a row crop, 1 year of a small grain, and 1 year of hay. More intensive use can be made of the soils, however, if moisture is conserved and soil losses are checked by tilling on the contour and by properly managing crop residue on long slopes. Also, terraces or contour stripcropping and diversion ditches can be used to control erosion and conserve moisture.

CAPABILITY UNIT IIe-5

This unit consists of deep, gently sloping, moderately well drained, loamy or sandy soils that lie in old lakebeds and on stream terraces. These soils are of the Collamer, Elnora, Galen, and Scio series. They are more erodible than the soils in unit IIe-4, and they are slightly wet in spring, mainly because of a seasonally high water table.

Natural fertility ranges from medium to low, and moderate to large additions of lime are generally needed. The moisture-supplying capacity is high in the Collamer and Scio soils, but it is somewhat lower in the other soils. In dry periods plants generally show a lack of sufficient moisture first on the Elnora soil.

The soils in this unit are suitable for cropping that requires stone-free tillage. They can be intensively row cropped in fields where slopes are short and more nearly level, but the Collamer and Scio soils crust on the surface and form a plowpan unless they are carefully managed. In areas where runoff is a hazard, the maximum intensity of cropping should be held to 1 year of a row crop, 1 year of a small grain, and 1 year of hay. Crop residue management, minimum tillage, and the regular use of sod crops in the rotation are needed to reduce surface crusting and to control erosion.

CAPABILITY UNIT IIe-6

In this unit are deep, gently sloping, moderately well drained soils that have a silt loam surface layer and a clayey subsoil. These soils are of the Cazenovia, Nunda, and Schoharie series. They are nearly as susceptible to erosion as the soils in unit IIe-4. Their natural fertility ranges from medium to high, and their moisture-supplying capacity from moderate to high.

The soils of this unit are not well suited to continuous row cropping. Because the water table is seasonally high, planting in spring and tillage in summer may be delayed. If practices are not used for controlling erosion, the maximum intensity of cropping should not exceed 1 year of a row crop, 1 year of a small grain, and 2 years of hay. Terracing and stripcropping help to control erosion. Surface crusting can be reduced by properly managing crop residue and by using sod crops in the rotation.

CAPABILITY UNIT IIw-1

This unit consists of deep, nearly level soils that occupy gravelly terraces and sandy lake plains. These soils are of the Fredon, Galen, Minoa, and Phelps series. Drainage is moderately good in the Galen and Phelps soils, but it is somewhat poor in the Fredon and Minoa soils. All the soils have moderate natural fertility and high moisture-supplying capacity.

The soils of this unit are easily kept in good tilth, but where the Fredon soils are dominant, fields are usually too wet for cultivation early in spring. Installing tile drains is necessary if winter grain and deep-rooted legumes are to be grown. Fields that are drained can be intensively row cropped if fertility is properly maintained.

CAPABILITY UNIT IIw-2

This unit consists of deep, nearly level, moderately well drained soils on uplands. These soils are of the Cazenovia, Conesus, Hilton, Lima, and Marilla series. They have a medium-textured surface layer, and the Marilla soil is shaly.

The impeded drainage in these soils is caused by a dense, slowly permeable subsoil or substratum. This may delay planting briefly in spring. Natural fertility is moderate to high except in the Marilla soil, which has low natural fertility. The Marilla soil is strongly acid, but the others have a medium to high content of lime. All the soils have moderate to high moisture-supplying capacity, though none of them can be kept in good tilth as easily as the soils in unit IIw-1.

Properly managed, the soils in this unit are highly productive of most crops grown locally. If drainage is improved so that excess surface water is removed, the moisture content will be more nearly uniform throughout a field and crops can be planted earlier in spring.

CAPABILITY UNIT IIw-3

Only Eel silt loam is in this unit. This deep, nearly level, moderately well drained soil occupies flood plains. It is high in natural fertility and in moisture-supplying capacity, and it is generally easy to keep in good tilth.

Most crops grown locally are suited to this soil, but improved drainage may be necessary for cultivation early in spring. Flooding is likely to damage crops about once every 5 years.

CAPABILITY UNIT IIs-1

The only soil in this unit is Manlius very shaly silt loam, 3 to 8 percent slopes. This well-drained, strongly acid soil is shallow to shale bedrock. Shale crops out in some places, but generally it is fractured enough to be penetrated by roots of deep-rooted legumes. Natural fertility is low in this soil, and the moisture-supplying capacity is low because of shallowness and the content of shale fragments. Runoff is medium, and the erosion hazard is moderate.

If practices are not used to control soil losses, the maximum intensity of cropping on this soil should not be more than 1 year of corn, 1 year of a small grain, and 3 years of hay.

CAPABILITY UNIT IIIe-1

This unit consists of moderately sloping, medium-textured, well-drained soils on uplands. These soils are underlain by firm, calcareous glacial till and are of the Lansing, Mohawk, and Ontario series. Shale bedrock occurs at a depth of 20 to 40 inches in the moderately deep Mohawk shaly silt loam and at a greater depth in the other soils.

Natural fertility ranges from high to moderate. The moisture-supplying capacity generally is high, though it is lower in the shallower areas of the moderately deep Mohawk soil. Permeability is moderate in the primary root zone, but it is moderately slow or slow in the firm glacial till. Runoff is rapid, and the erosion hazard is severe.

The soils of this unit are fairly easily kept in good tilth. Unless practices are used to control erosion, however, the maximum intensity of cropping should not exceed 1 year of a cultivated crop, 1 year of a small grain, and 6 years of hay. In fields where slopes are long enough, stripcropping, sodding the waterways, and installing diversion ditches or terraces will permit more intensive use. The Mohawk soils have complex slopes in many places, and on these slopes contour measures are difficult or impractical to use. Here, crop residue and cover crops left in the field over winter, together with use of minimum tillage, will allow more intensive cultivation.

CAPABILITY UNIT IIIe-2

This unit consists of deep, moderately sloping, well-drained soils on glacial outwash terraces. These soils are shaly or gravelly and are of the Chenango and Palmyra series. The Palmyra soils contain lime and have moderate

to high natural fertility, but the Chenango soil is strongly acid and low in natural fertility. Although runoff is rapid, all the soils have moderate moisture-supplying capacity. Permeability is moderate in the surface layer and upper subsoil but is very rapid in the substratum.

These soils are suitable for cultivation, and they are easy to keep in good tilth. Unless practices are used for controlling erosion, however, the maximum intensity of cropping should not exceed 1 year of corn, 1 year of a small grain, and 2 years of hay.

The soils of this unit are highly susceptible to erosion, but contour measures may be impractical in areas where slopes are short and complex. Among the practices suitable in these areas are minimum tillage, crop residue management, and the use of winter cover crops.

CAPABILITY UNIT IIIe-3

In this unit are deep, well-drained, loamy soils that occur in old lakebeds. These soils are of the Arkport and Dunkirk series. They are moderately sloping, have rapid runoff, and are highly erodible. Their moisture-supplying capacity ranges from moderate to high, but so much rainwater is lost through runoff that in dry periods crops show lack of sufficient moisture sooner on these soils than on similar but more mildly sloping soils nearby. Natural fertility ranges from low to moderate.

If the soils in this unit are well managed, they can be kept in good tilth. Unless protective measures are used, however, cropping should not be more intensive than 1 year of a row crop, 1 year of a small grain, and 5 years of hay. Short, complex slopes are common, and contour practices are impractical in many places. In fields where contour cultivation and stripcropping are not practical, erosion can be reduced by using minimum tillage, properly managing crop residue, and growing winter cover crops.

CAPABILITY UNIT IIIe-4

This unit consists of deep, moderately sloping, moderately well drained and well drained soils having a surface layer of silt loam. These soils are of the Cazenovia and Nunda series. They have a clayey subsoil and substratum that impede drainage. Their natural fertility and moisture-supplying capacity are moderate to high. Runoff is rapid, and the hazard of erosion is severe.

If the soils in this unit are mismanaged or permitted to erode, good tilth is difficult to restore and maintain. Conservation practices are needed in areas where row crops are grown. Effective in controlling soil losses are diversion terraces, contour stripcropping, crop residue management, and sod crops. These measures, together with adequate liming and fertilization, will help to assure favorable growth of field crops. If practices are not used for controlling erosion, the maximum intensity of cropping should not be more than 1 year of a row crop, followed by a fall-seeded crop of small grain and then 6 years of hay.

CAPABILITY UNIT IIIe-5

Soils in this unit are deep, moderately sloping, and somewhat poorly drained. They have a silt loam surface layer and are of the Darien, Fremont, and Remsen series. These soils have rapid runoff and are highly susceptible to erosion. In addition, they have a slowly permeable subsoil that causes them to be moderately wet in spring and in rainy periods. Unless corrected, this wetness delays planting and limits the choice of crops. Natural fertility is moderate to high in the Darien and Remsen soils but is low in the Fremont soil. Where the soils are mismanaged or eroded, restoring good tilth is difficult.

If these soils are not protected from erosion, cropping should be no more intensive than 1 year of a cultivated crop, followed by a fall-seeded small grain and then 6 years of hay. Using diversion terraces, stripcropping, sodded waterways, and crop residue management will permit more intensive farming. Sod crops benefit from nitrogen fertilizer by using moisture more efficiently early in spring.

CAPABILITY UNIT IIIe-6

This unit consists of deep, moderately sloping, moderately well drained soils on uplands. These soils are of the Conesus and Marilla series. They have a silt loam surface layer, which is shaly in the Marilla soil. Rapid runoff and a severe erosion hazard are major concerns in the management of these soils. Also, slight wetness may delay planting briefly in spring. Natural fertility is moderate in the medium-lime Conesus soil but is low in the strongly acid Marilla soil. The moisture-supplying capacity ranges from moderate to high.

Crops grown on these soils respond to careful management. Unless practices are used for controlling erosion, however, the maximum intensity of cropping should not exceed 1 year of a row crop, 1 year of a fall-seeded small grain, and 2 years of sod. Summer rainfall can be stored in the soils if runoff is kept to a minimum.

CAPABILITY UNIT IIIe-7

The only soil in this unit is Manlius very shaly silt loam, 8 to 15 percent slopes. This well-drained, strongly acid soil is moderately deep over shale bedrock. Shale crops out in some places and slightly hinders tillage. Runoff is rapid, and the erosion hazard is severe. Natural fertility is low. The moisture-supplying capacity ranges from low to moderate, but plant roots generally can obtain some moisture in the fractured bedrock.

In cultivated fields, these soils can be protected from erosion by stripcropping on the contour, sodding the waterways, and using other conservation practices. Unless these practices are used, the maximum safe intensity of cropping is 1 year of a small grain and 5 years of sod. Topdressing old stands of hay with nitrogen fertilizer increases productivity and improves the use of moisture in spring.

CAPABILITY UNIT IIIe-8

In this unit are eroded, gently sloping, somewhat poorly drained soils of the Hornell and Remsen series on uplands. These soils have lost most of their original surface layer through erosion, and their present surface layer is clayey and generally in poor tilth. Also, the soils are highly erodible and are moderately wet at times. Natural fertility is moderate to low. The Remsen soil contains lime, whereas the Hornell soil is strongly acid. In both soils the moisture-supplying capacity is high. Because of rapid runoff and the clayey surface layer, however, water intake is reduced and the moisture available to plants is often critical in dry periods.

The soils in this unit are well suited to hay and pasture. Unless they are protected by erosion control practices,

the maximum intensity of cropping should not exceed 1 year of a row crop, 1 year of a small grain, and 5 years of sod crops. Intensive management is needed before the soils can be even moderately productive.

CAPABILITY UNIT IIIw-1

This unit consists of somewhat poorly drained, nearly level soils that have a silt loam surface layer and a slowly permeable subsoil. The soils are of the Burdett, Darien, Fremont, Odessa, Ovid, Remsen, and Rhinebeck series. In managing these soils, moderate wetness is the major concern. After a heavy shower, temporary ponding in depressions may damage row crops. The moisture-supplying capacity is good. Natural fertility is moderate to high in all the soils except the Fremont.

Row crops can be grown on these soils if runoff from higher areas is diverted and if excess water in low areas is removed by tiling or surface grading. Except for draining small wet spots, however, tiling is generally not practical. Cultivating fields that are wet impairs tilth. In undrained areas, favorable yields of forage can be obtained from water-tolerant grasses that are properly fertilized.

CAPABILITY UNIT IIIw-2

This unit consists of nearly level, somewhat poorly drained soils that have a silt loam surface layer and a fairly permeable subsoil. These soils are of the Collamer, Manheim, and Niagara series. They are high in natural fertility and in moisture-supplying capacity.

Although these moderately wet soils are not difficult to keep in good tilth, they are better suited to moisture-tolerant grasses than to other plants unless they are drained. Adequate drainage can be provided by tiling, bedding, or surface grading. All crops, including cultivated crops, respond well if drainage is improved.

CAPABILITY UNIT IIIw-3

The only soil in this unit—Stafford loamy fine sand, 0 to 2 percent slopes—is rapidly permeable but somewhat poorly drained. Although this soil has low natural fertility, it produces favorably under good management. Satisfactory tilth is fairly easy to maintain, and truck crops are well suited to drained areas because the surface layer is sandy and free of gravel.

Undrained areas of this moderately wet soil are better used for moisture-tolerant grasses than for row crops, though short-season crops can be grown if they are planted late in spring. Where the soil is used intensively, however, it needs to be tile drained.

CAPABILITY UNIT IIIw-4

This unit consists of somewhat poorly drained, gently sloping soils that have a silt loam surface layer and a slowly permeable subsoil. These soils are of the Burdett, Darien, Fremont, Odessa, Ovid, and Remsen series. Their natural fertility generally ranges from moderate to high. Their moisture-supplying capacity is high, though much moisture is lost through surface runoff.

Wetness is the main concern in the management of these soils. Tile drains are poorly suited, but terraces can be used in some places for removing excess surface water and controlling erosion. Also suitable for reducing wetness and checking soil losses are diversion ditches, stripcropping, and sodded waterways. Unless the soils are protected from erosion, they are difficult to keep in good tilth. The maximum intensity of cropping should not exceed 1 year of a cultivated crop, 1 year of a small grain, and 4 years of sod crops. Suitable grasses do well on these soils in undrained areas.

CAPABILITY UNIT IIIw-5

This unit consists of somewhat poorly drained, gently sloping soils that have a silt loam surface layer and a fairly permeable subsoil. These soils are of the Appleton and Manheim series. They are wet because they receive runoff from adjacent areas and have a dense, slowly permeable substratum. Natural fertility and the moisture-supplying capacity are high, though a considerable amount of moisture is lost through surface runoff.

In most places the soils of this unit can be drained by installing tile. If practices are not used for controlling erosion, the maximum intensity of cropping should not exceed 1 year of a cultivated crop, 1 year of a small grain, and 2 years of sod crops. Growth of cultivated crops is more dependable if runoff from nearby areas is diverted through terraces or diversion ditches. Natural drainageways left in sod will remove excess water safely.

CAPABILITY UNIT IIIw-6

Only Middlebury silt loam is in this unit. This soil is nearly level, acid, and moderately well drained. It occupies flood plains, where flooding is a moderate hazard during the growing season. In addition, the soil is slightly to moderately wet because of a high water table. The moisture-supplying capacity is high. Natural fertility is low, but favorable growth can be obtained from all the common crops if they are well managed. Among the well-suited plants are those used for hay or pasture. Practices are needed that control streambank erosion, stream gouging, and deposition.

CAPABILITY UNIT IIIw-7

Only Muck, deep, is in this unit. The organic material that makes up this land type is neutral to strongly acid. If drained, it is highly productive and can be used for cash crops of high value. Under intensive cultivation, however, the material decomposes and settles. Controlled drainage is needed for keeping the muck moist, reducing shrinkage, and preventing excessive dryness. Also needed are barriers that protect cultivated areas from wind damage.

CAPABILITY UNIT IIIs-1

Only Benson soils, 0 to 8 percent slopes, are in this unit. These soils are cherty, medium textured, and somewhat excessively drained. They are 10 to 20 inches deep over hard limestone bedrock, and limestone crops out in a few places. Tillage is hindered by outcropping bedrock and by shallow spots. The soils are neutral or slightly acid throughout.

Low moisture-supplying capacity and a limited root zone are major concerns in the use and management of these soils. Although natural fertility is moderate, productivity is low except in years when rainfall is well distributed. The maximum intensity of cropping should not exceed 1 year of a cultivated crop, 1 year of a small grain, and 1 year of sod. Early-season crops are generally more productive than other crops on these soils. In dry years the forage produced may be limited to one cutting

of hay or to early grazing from a grass-trefoil pasture. However, it is possible to obtain a seed crop from perennial crops that produce early maturing seed. Measures that conserve moisture and control erosion are essential in gently sloping areas.

CAPABILITY UNIT IIIs-2

The only soil in this unit is Colonie loamy fine sand, 2 to 6 percent slopes. This soil is deep but is somewhat excessively drained. It has low natural fertility and low moisture-supplying capacity. Nevertheless, it contains few or no stone fragments and can be tilled early in spring. Permeability and the water-intake rate are rapid, and the risk of water erosion is only moderate. Soil blowing is a severe hazard, however, and crops can be damaged by windblown sand.

All crops common in the county can be grown on this soil, though productivity is only moderate. Deep-rooted crops are more suitable than shallow-rooted ones. Productivity generally is increased if crop residue is properly managed and if growing plants are protected from wind damage.

CAPABILITY UNIT IIIs-3

Only Made land, tillable, is in this unit. This land type occupies areas in which the original soils have been disturbed through the removal of their surface layer and, in some places, a considerable part of their subsoil. The remaining soil material is deep, nearly level or gently sloping, and well drained or moderately well drained. It ranges from gravelly sandy loam to silty clay loam in texture. Generally, it is in poor tilth and has limited moisture-supplying capacity.

Made land, tillable, is suited to sod crops. These crops help to improve tilth, and so does crop residue worked into the plow layer.

CAPABILITY UNIT IIIs-4

Only Ontario stony loam, 2 to 8 percent slopes, is in this unit. It is a deep, well-drained soil that contains lime. Generally, it is moderately difficult to till because the surface layer is stony. In addition, there are many stones and boulders in the subsoil. Natural fertility and the lime content are high, but the moisture-supplying capacity is only moderate. Although erosion is only a slight hazard, the loss of moisture through runoff can be critical during the growing season.

The management of this soil is similar to that of soils in unit IIe-1. Contour tillage and stripcropping are needed for controlling erosion in fields where row crops are grown. Sod-forming plants that include deep-rooted legumes respond well to fertilizer.

CAPABILITY UNIT IIIs-5

The soils in this unit are nearly level or gently sloping, moderately well drained, and high in lime content. They have a silt loam surface layer and are 20 to 36 inches deep over hard bedrock. These soils are of the Lima series and are somewhat similar to the Lima soils in unit IIe-4.

In the soils of this unit, drainage is slightly impeded by a substratum of firm, slowly permeable till. The depth to bedrock is variable, however, and there are wetter spots that are not practical to drain and small droughty areas where rock is just below the surface. Natural fertility is high, but the moisture-supplying capacity is variable. For these reasons, crops that can tolerate many kinds of soil condition should be considered in the use and management of these soils.

Good use can be made of these soils by growing a short-season crop or a sod-forming grass that is fertilized with a complete fertilizer. Practices that require earthmoving may be restricted by the limited depth to bedrock. On-site examination is needed.

CAPABILITY UNIT IVe-1

This unit consists of deep, well-drained, moderately steep or hilly soils that lie in old lakebeds and on glacial outwash terraces and kames. These soils are of the Arkport, Dunkirk, and Palmyra series. Natural fertility ranges from low in the sandy Arkport soils to moderate in the gravelly Palmyra soil and in Dunkirk silt loam. The moisture-supplying capacity is moderate to high, but the loss of moisture through runoff can be critical during the growing season. All the soils but the Palmyra are highly susceptible to erosion.

Except for the Dunkirk soil and some included areas that are eroded, the soils in this unit are fairly easy to keep in good tilth. Generally, they should not be row cropped unless practices are used for erosion control. Wherever possible, farming should be across the slope. Because short, complex slopes are so common, tilling and stripcropping on the contour are impractical. Reseeding by renovation for hay or pasture is advisable.

CAPABILITY UNIT IVe-2

This unit consists of deep, well-drained soils on moderately steep uplands. These soils have a silt loam or loam surface layer and are of the Lansing, Mohawk, and Ontario series. They have a moderate to high natural fertility, and their moisture-supplying capacity is high, but the loss of moisture through runoff can be critical during the growing season. The Lansing and Ontario soils have fairly uniform slopes, whereas in many places the Mohawk soil has complex slopes. Consequently, applying contour measures in fields of Mohawk soil is impractical.

Unless practices are used for controlling erosion on the soils in this unit, the maximum intensity of cropping should not exceed 1 year of a small grain and 6 years of sod. Cultivated crops can be grown on the lower, more nearly uniform slopes if stripcropping is combined with maintenance of high fertility and crop residue management. Mixtures of deep-rooted plants used for hay or pasture do well on these soils.

CAPABILITY UNIT IVe-3

In this unit are deep, moderately well drained soils on moderately steep uplands. These soils have a silt loam surface layer and are of the Darien and Nunda series. They have high moisture-supplying capacity and moderate natural fertility. The soils are highly erodible and are temporarily wet in spring.

Good tilth is difficult to maintain in these soils. The maximum intensity of cropping should be limited to 1 year of a small grain and 6 years of sod. Stripcropping can be used if the soils occur in small areas that are part of fields made up chiefly of less sloping soils. To maintain productivity of hay stands, topdress sod with fertilizer and keep the surface covered with crop residue over

winter. Steep or irregularly sloping areas in which farm work is hazardous should be seeded to suitable grasses and legumes.

CAPABILITY UNIT IVe-4

This unit consists of moderately deep, well-drained, shaly soils that occupy moderately steep hillsides in the uplands. These soils have a surface layer of shaly or very shaly silt loam and are of the Manlius and Mohawk series. The Mohawk soil is high in lime content and in natural fertility. The Manlius soil is strongly acid and has low natural fertility. In both soils the moisture-supplying capacity is limited by the shale content and the moderate depth of bedrock. In addition, moisture losses through runoff are usually critical during the growing season. Erosion is a severe hazard, but short, complex slopes are common, especially in areas of Mohawk soil, and here it is impractical to use contour measures for controlling erosion and conserving water.

The soils in this unit can be safely used by renovating old sod, seeding legumes, and applying lime and fertilizer. Because of its high lime content, the Mohawk soil responds more favorably than the Manlius soil to this kind of management.

CAPABILITY UNIT IVe-5

This unit consists of deep, moderately sloping, eroded silty clay loam soils that are moderately well drained or somewhat poorly drained. These soils are of the Cazenovia, Hornell, Remsen, and Schoharie series. Their surface layer is lumpy or cloddy and difficult to cultivate, for it contains clayey material that was originally part of the subsoil.

Although these soils are slightly or moderately wet in spring, they are very slowly permeable, have rapid runoff, and are highly susceptible to erosion. Their surface layer holds so little moisture available for plant growth that seeds of row crops germinate poorly, and lack of sufficient moisture can be critical for all crops during the growing season. Natural fertility is moderate in all the soils but the Hornell, which is strongly acid and low in fertility.

The soils of this unit can be cultivated if they occupy small areas that are part of a large field. These eroded areas, however, should be cultivated less intensively than the rest of the field, and they need extra amounts of crop residue worked into the surface layer. If the soils are not protected from erosion by suitable practices, they should be in sod continuously or planted to a small grain only occasionally and protected by sod most of the time.

CAPABILITY UNIT IVw-1

This unit consists of poorly drained, nearly level soils that have a medium-textured surface layer and a fairly permeable, medium-textured or moderately coarse textured subsoil. These soils are of the Appleton, Canandaigua, Halsey, Kendaia, Lamson, and Lyons series. Their natural fertility and moisture-supplying capacity are high. Except in the Canandaigua soil, good tilth can be maintained fairly easily, but surface crusts and plowpans are likely to form if the soils are mismanaged.

These soils cannot be successfully used for row crops unless they are drained, but they can be intensively cropped after drainage is improved. Their response to tiling is good. The use of undrained areas is generally limited to pasture or, in dry years, to short-season crops.

CAPABILITY UNIT IVw-2

In this unit are poorly drained and very poorly drained, nearly level and gently sloping, loamy soils of the Allis, Ilion, Lakemont, Madalin, and Romulus series. Except for the Allis, these soils are high in natural fertility. Erosion is a hazard on the gently sloping Ilion soil.

Wetness and the difficulty of providing adequate drainage limit the use of soils in this unit. Row crops cannot be grown unless the soils are drained, but the response to tiling is generally poor. Maintaining good tilth is more difficult in the Allis, Lakemont, and Madalin soils than it is in the Ilion and Romulus soils.

If these soils are well fertilized with nitrogen, they produce favorable growth of forage from water-tolerant grasses. They also can be used for crops that provide summer forage, especially in dry years.

CAPABILITY UNIT IVw-3

This unit consists of poorly drained and somewhat poorly drained, nearly level soils on flood plains. These soils have a silt loam surface layer and are of the Holly and Wayland series. They are wet and are subject to severe flooding. Their moisture-supplying capacity and natural fertility are high.

If row crops are grown on these soils, artificial drainage is needed but it is difficult to install because adequate outlets are generally lacking. Also needed are measures that control streambank erosion, stream gouging, and deposition. The most dependable use is for hay or pasture consisting of grasses that are tolerant of periodic flooding.

CAPABILITY UNIT IVw-4

This unit consists of very poorly drained, level or nearly level, medium-textured and moderately coarse textured soils that have a mucky surface layer. These soils are of the Alden, Canandaigua, and Lamson series. Their natural fertility and moisture-supplying capacity are high.

These soils are not difficult to keep in good tilth, but before they can be used for row crops they must be artificially drained. Although the response to tile drainage is good, adequate outlets are hard to establish in many places. Unless the water level is controlled, the use of these soils is limited to summer pasture.

CAPABILITY UNIT IVw-5

Only Muck, shallow, is in this unit. It is very poorly drained and consists of organic material that is moderately deep or shallow over mineral material. This land must be drained before it can be row cropped successfully. Because the muck is thin and shrinks if used for crops, it can be cultivated for only a few years. Generally, in areas where the muck is less than 3 feet thick, it is not economically feasible to develop the land for cultivation. These areas are more suitable as habitat for wildlife.

CAPABILITY UNIT IVs-1

This unit consists of moderately sloping to strongly sloping, excessively drained, medium-textured soils of

the Benson series that generally are 12 to 20 inches deep over limestone bedrock. Limestone crops out in many places and interferes with tillage. Although natural fertility is high, the soils are droughty. Also, they are highly erodible, especially on the steeper slopes.

In some areas these soils are too steep for modern farm machinery. Consequently, they are better suited to sod crops, pasture, or woodland than they are to row crops. In the deeper areas, pasture can be improved by renovating the sod and then seeding suitable legumes.

CAPABILITY UNIT IVs–2

The only soil in this unit is Colonie loamy fine sand, 6 to 12 percent slopes. This soil is deep, rapidly permeable, and somewhat excessively drained. For shallow-rooted crops, its natural fertility and moisture-supplying capacity are very low, but its capacity for supplying moisture to deep-rooted crops is higher. Water erosion and soil blowing are severe hazards.

In many places this soil has short, complex slopes, and here it is impractical to use contour measures for conserving moisture and controlling erosion. Producing crops other than deep-rooted legumes cut for hay requires irrigation and crop residue management. Pasture yields are low and are limited to the early part of the growing season.

CAPABILITY UNIT IVs–3

This unit consists of nearly level and gently sloping, somewhat poorly drained soils that are 20 to 40 inches deep over bedrock. These soils have a silt loam surface layer and are of the Angola and Kendaia series. All contain lime and have high to moderate natural fertility. The moisture-supplying capacity is variable; it depends on the depth to bedrock. The Angola soils have a clayey, slowly permeable subsoil and generally are underlain by shale bedrock. The Kendaia soil has a moderately permeable root zone and, in most places, is underlain by limestone bedrock. Erosion is a severe hazard on the sloping Angola soil.

Although the soils in this unit are moderately wet, it generally is impractical to drain them because their depth to bedrock is so variable. The soils are suited to late-planted crops, but ordinarily they are better suited to water-tolerant grasses and legumes than they are to row crops. Erosion control practices are needed in gently sloping areas that are included in fields consisting mostly of other soils.

CAPABILITY UNIT Vw–1

Only Alluvial land is in this unit. This nearly level land consists of variable soil materials that lie among small streams. Here, flooding is a severe hazard, and gouging occurs in places. The material is gravelly in some areas and loamy in others. Its moisture-supplying capacity and natural fertility are variable. Pasture is a good use for this land.

CAPABILTY UNIT VIe–1

The soils in this unit are steep, well drained, and deep or moderately deep. They are of the Arkport, Dunkirk, Lansing, Manlius, Ontario, and Palmyra series. Runoff is rapid, erosion is a severe hazard, and the lack of available moisture is usually critical during the growing season. Natural fertility is moderate to high in all the soils except the Manlius.

The soils in this unit are generally too steep for the safe use of farm machinery. Open areas are suitable for pasture, and the lesser slopes can be renovated and seeded to adapted legumes.

CAPABILITY UNIT VIe–2

This unit consists of moderately steep, eroded soils that are moderately well drained. These soils are of the Cazenovia, Fremont, Hornell, Remsen, and Schoharie series. They have rapid runoff, are highly susceptible to erosion, and have very low moisture-supplying capacity. Tilth is poor, and the rate of seed germination is very low. Keeping the soils permanently covered with plants is essential for controlling erosion, though in places old sod can be renovated for hay or pasture.

CAPABILITY UNIT VIw–1

This unit consists of deep, nearly level, very poorly drained soils that lie in depressional areas, where rainfall in summer can severely damage crops because of ponding. These soils are of the Fonda series. They are difficult to drain, for their subsoil is very slowly permeable and suitable outlets are generally lacking. In areas that are accessible, the soils can be fertilized and used for summer hay or pasture.

CAPABILITY UNIT VIs–1

Ontario stony loam, 8 to 15 percent slopes, is the only soil in this unit. It is a well-drained soil in which the surface layer and subsoil contain many stones and boulders that severely limit tillage for cultivated crops. Natural fertility is high, and the moisture-supplying capacity is moderate. Severe erosion is likely unless a protective cover is maintained.

Open areas of this soil can be used for pasture. Topdressing pasture with nitrogen early in spring increases the early growth of forage.

CAPABILITY UNIT VIIe–1

In this unit are steep, well drained and moderately well drained soils of the Remsen and Schoharie series. These soils are moderately fertile, but generally they are too steep for modern farm equipment. In addition, they are highly erodible, and during the growing season they may hold little moisture available to plants because so much water is lost through rapid runoff.

These soils are suitable for native pasture, as woodland, or as habitat for wildlife. If pasture is needed early in spring, cleared areas can be topdressed with nitrogen to improve the growth of pasture plants.

CAPABLITY UNIT VIIe–2

In this unit are severely eroded, moderately sloping to steep soils of the Remsen series. These soils have very low moisture-supplying capacity. Because they are gullied and highly erodible, they are not suitable for cultivation. Pasture does poorly on these soils; woodland or wildlife habitat is a more suitable use.

CAPABILITY UNIT VIIw–1

Only Sloan silt loam is in this unit. This nearly level, very poorly drained soil occupies flood plains. Here, it is frequently flooded and is too wet for crops, and generally it cannot be drained. In some places the soil provides midsummer pasture of poor quality. Ordinarily, however, it is more suitable as woodland or as habitat for wildlife.

CAPABILITY UNIT VIIw-2

This unit consists of very poorly drained organic soils or mineral soils that are moderately deep to shallow over marl. These soils are of the Edwards and Warners series. Generally, they occur in areas that are unfavorable to drain, and they are better left as woodland or as habitat for wildlife.

CAPABILITY UNIT VIIs-1

This unit consists of medium-textured Benson soils that are too rocky, too steep, and too droughty for cropping and are poor for pasture. They are more suitable as woodland or as habitat for wildlife.

CAPABILITY UNIT VIIIs-1

In this unit is Rockland, limestone, a nearly level or gently sloping land type. Most of the acreage has a thin covering of soil material, but about 25 percent of the surface consists of exposed limestone. This land type is not suitable for commercial plant production. It can be used as habitat for wildlife.

CAPABILITY UNIT VIIIs-2

In this unit is the land type, Made land and Dumps. It consists of areas in which the original soil has been disturbed because of gypsum mining or rock quarrying. These areas support little or no vegetation and are not suitable for the commercial production of plants. They may be suitable for other uses, but each area should be investigated to determine its suitability.

CAPABILITY UNIT VIIIw-1

Only Fresh water marsh is in this unit. This land type consists of areas that are permanently under water and

TABLE 1.—*Estimated average acre*

[Yields in columns A are those to be expected under average management; those in columns B, under improved

Soil	Forage mixtures (hay)						Corn for silage	
	Alfalfa-grass		Alfalfa-birdsfoot trefoil-grass		Birdsfoot trefoil-grass			
	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Alden mucky silt loam						3.0		22
Allis silty clay loam, deep, 0 to 4 percent slopes		2.5		3.0	0.8	1.5		12
Angola silt loam, 0 to 3 percent slopes			2.5	3.2	2.0	2.8	8	13
Angola silt loam, 3 to 8 percent slopes			2.5	3.2	2.0	2.8	8	12
Appleton silt loam, 3 to 8 percent slopes			2.5	3.5	2.0	3.0	8	14
Arkport very fine sandy loam, 1 to 6 percent slopes	2.5	4.0					12	17
Arkport very fine sandy loam, 6 to 12 percent slopes	2.0	3.5					9	13
Arkport and Dunkirk soils, 12 to 20 percent slopes	1.8	3.0					6	10
Benson soils, 0 to 8 percent slopes	1.5	3.5		3.5		3.0		15
Benson soils, 8 to 25 percent slopes	2.0	3.0		3.0		2.5		12
Burdett silt loam, 0 to 3 percent slopes			2.5	3.5	2.0	3.0	9	16
Burdett silt loam, 3 to 8 percent slopes			2.5	3.5	2.0	3.0	8	14
Canandaigua silt loam, 0 to 2 percent slopes		2.5		3.0		3.0		16
Canandaigua mucky silt loam, 0 to 2 percent slopes		2.5		3.0		2.0		16
Cazenovia silt loam, 0 to 3 percent slopes	3.5	4.5	3.0	4.0			15	20
Cazenovia silt loam, 3 to 8 percent slopes	3.0	4.0	2.5	3.5			14	18
Cazenovia silt loam, 8 to 15 percent slopes	2.5	3.5	2.0	3.0			12	15
Cazenovia silty clay loam, 8 to 15 percent slopes, eroded	1.5	2.5	1.5	2.5			6	10
Cazenovia silty clay loam, 15 to 25 percent slopes, eroded	1.0	2.0	1.0	2.0				
Chenango shaly silt loam, 0 to 3 percent slopes	2.0	4.0					10	18
Chenango shaly silt loam, 3 to 8 percent slopes	1.8	3.5					9	18
Chenango shaly silt loam, 8 to 15 percent slopes	1.5	3.0					7	14
Collamer silt loam, 2 to 6 percent slopes	3.0	4.5	2.5	3.5			11	21
Colonie loamy fine sand, 2 to 6 percent slopes	2.0	3.0					8	18
Colonie loamy fine sand, 6 to 12 percent slopes	1.6	3.0					7	18
Conesus silt loam, 0 to 3 percent slopes	3.5	4.5	3.0	4.0			16	20
Conesus silt loam, 3 to 8 percent slopes	3.0	4.0	2.5	3.5			14	18
Conesus silt loam, 8 to 15 percent slopes	2.5	3.5	2.0	3.0			12	15
Darien silt loam, 0 to 3 percent slopes			2.5	3.5	2.0	3.0	9	16
Darien silt loam, 3 to 8 percent slopes			2.5	3.5	2.0	3.0	8	14
Darien silt loam, 8 to 15 percent slopes	2.5	3.5	2.5	3.5	2.0	3.0	7	12
Darien silt loam, 15 to 25 percent slopes	2.5	3.5	2.2	3.0	1.7	2.5	5	10
Dunkirk silt loam, 2 to 6 percent slopes	3.0	4.0					11	16
Dunkirk silt loam, 6 to 12 percent slopes	2.5	3.5					9	15
Eel silt loam	3.5	4.5	3.0	4.5			16	21
Elnora loamy fine sand, 2 to 6 percent slopes	2.2	3.5	2.0	3.0			10	14
Fonda mucky silt loam						2.5		16
Fremont silt loam, 0 to 3 percent slopes			2.0	3.5	2.0	3.0	7	14
Fremont silt loam, 3 to 8 percent slopes			2.0	3.5	2.0	3.0	7	14
Fremont silt loam, 8 to 15 percent slopes			1.8	3.0	1.8	2.8	6	12
Galen and Minoa very fine sandy loams, 0 to 2 percent slopes	2.5	.4	2.5	4.0	1.8	2.5	10	17
Galen very fine sandy loam, 2 to 6 percent slopes	2.5	4.0	2.5	4.0	1.8	2.8	10	17

support various kinds of marsh vegetation. It also consists of areas where shallow water is impounded for wildlife habitat. Fresh water marsh is not suitable for the commercial production of plants, but it can be used for recreation, wildlife, or water supply.

Estimated Yields [3]

Table 1 gives the estimated average acre yields of the principal crops that are grown on soils of the county suitable for cultivation. The estimates are based on yields actually obtained by farmers in the early 1960's. Yields for the following soils and miscellaneous land types are not shown in the table, because crops are not suited to them or are not commonly grown on them (see table 2 for yields of specialty crops grown on Muck, deep, and Muck, shallow):

Alluvial land.
Arkport and Dunkirk soils, 20 to 40 percent slopes.
Benson soils, 25 to 40 percent slopes.
Edwards muck.
Fresh water marsh.
Made land and Dumps.
Manlius very shaly silt loam, 25 to 40 percent slopes.
Ontario and Lansing soils, 25 to 40 percent slopes.
Palmyra and Arkport soils, 25 to 40 percent slopes.
Remsen soils, 25 to 40 percent slopes.
Remsen soils, 25 to 40 percent slopes, severely eroded.
Rockland, limestone.
Schoharie soils, 20 to 40 percent slopes, eroded.
Sloan silt loam.
Warners loam.

[3] D. E. PAYNTER, soil conservationist, Soil Conservation Service, and DERWOOD G. BURNS, agricultural extension agent, Genesee County, helped to prepare this subsection.

yields of the principal crops

management. Absence of yield figure indicates that crop is not suited to the soil or is not commonly grown on it]

Corn for grain		Oats		Wheat		Sweet corn		Dry beans		Snap beans		Peas	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
---	110	---	65	---	45	---	5.0	---	30	---	3.0	---	---
---	60	---	50	---	---	---	---	---	---	---	---	---	---
---	55	65	75	---	28	---	---	---	---	---	---	---	---
40	55	60	70	15	25	---	---	---	---	---	---	---	---
40	65	65	75	18	32	---	---	---	---	---	---	---	---
60	80	65	85	30	35	3.2	4.2	20	30	2.0	3.0	1.0	1.5
50	65	55	75	25	30	2.5	3.5	16	25	1.3	2.8	.7	1.0
30	52	45	65	18	25	---	---	---	---	---	---	---	---
---	75	25	45	25	40	---	---	---	---	---	---	.8	1.2
---	60	---	40	---	30	---	---	---	---	---	---	---	---
---	65	70	80	---	30	---	---	---	25	---	2.5	---	---
40	65	65	75	18	32	---	---	---	---	---	---	---	---
---	80	---	65	---	35	---	5.0	---	30	---	3.0	---	2.5
---	80	---	65	---	---	---	5.0	---	30	---	3.0	---	2.5
75	100	80	90	40	50	3.5	5.0	22	30	2.0	3.0	1.2	1.8
72	90	75	80	40	50	3.0	4.5	20	25	1.8	2.7	1.0	1.5
60	80	60	75	35	45	---	---	---	---	---	---	---	---
35	50	40	55	25	30	---	---	---	---	---	---	---	---
---	---	35	45	20	25	---	---	---	---	---	---	---	---
55	90	50	60	30	45	---	---	18	25	---	---	1.5	2.0
50	90	60	75	26	45	---	---	15	20	---	---	1.0	1.5
45	70	50	65	22	28	---	---	---	---	---	---	---	---
60	105	70	70	30	45	2.5	4.5	20	25	1.5	3.0	.8	1.2
45	90	60	80	26	35	2.5	4.0	15	30	1.5	3.0	1.0	1.5
40	90	50	70	25	30	1.7	3.3	15	23	1.0	2.6	.7	1.0
75	100	80	90	40	50	3.5	5.0	22	30	2.0	3.0	1.2	1.8
72	90	75	85	40	50	3.0	4.5	20	25	1.8	2.7	1.0	1.5
60	80	60	75	35	45	---	---	---	---	---	---	---	---
---	65	70	80	---	30	---	---	---	---	---	---	---	---
40	65	65	75	18	32	---	---	---	---	---	---	---	---
35	60	60	70	15	30	---	---	---	---	---	---	---	---
---	---	50	60	---	---	---	---	---	---	---	---	---	---
60	80	70	80	30	35	2.5	4.5	20	25	1.5	3.0	.8	1.2
50	70	60	75	25	30	---	---	---	---	---	---	---	---
75	110	55	70	35	45	4.0	6.0	25	35	2.5	3.5	1.8	2.8
50	70	50	80	25	35	3.0	5.0	15	30	2.0	3.0	1.5	2.5
60	80	---	55	---	35	---	---	---	---	---	---	---	---
---	60	60	80	---	30	---	---	---	---	---	---	---	---
---	65	60	80	---	30	---	---	---	---	---	---	---	1.5
---	---	50	70	---	28	---	---	---	---	---	---	---	---
50	85	60	70	20	40	2.5	5.5	18	30	1.8	3.5	1.3	2.5
50	80	60	70	25	40	2.5	5.0	20	30	2.0	3.5	1.5	2.5

TABLE 1.—*Estimated average acre*

Soil	Forage mixtures (hay): Alfalfa-grass		Forage mixtures (hay): Alfalfa-birdsfoot trefoil-grass		Forage mixtures (hay): Birdsfoot trefoil-grass		Corn for silage	
	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Genesee silt loam	3.5	5.0					17	23
Halsey silt loam, 0 to 4 percent slopes		2.5				2.0		14
Hilton loam, 0 to 3 percent slopes	3.5	4.5	3.0	4.0			16	20
Hilton loam, 3 to 8 percent slopes	3.0	4.0	2.5	3.5			14	18
Holly silt loam					1.0	2.0		
Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes	3.0	4.0					13	16
Hornell silty clay loam, 3 to 8 percent slopes, eroded			2.0	3.0				12
Hornell silty clay loam, 8 to 15 percent slopes, eroded			2.0	3.0	1.5	2.5		10
Hornell and Fremont soils, 15 to 25 percent slopes, eroded			1.5	2.5	1.5	2.5		
Ilion silt loam, 0 to 3 percent slopes					1.5	2.5		16
Ilion silt loam, 3 to 8 percent slopes					1.5	2.5	8	16
Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes					2.0	3.0		
Lakemont silty clay loam		2.5			1.5	2.5		10
Lamson very fine sandy loam				3.5	2.0	3.0	8	18
Lamson mucky very fine sandy loam						3.0		18
Lansing silt loam, 3 to 8 percent slopes	3.0	4.5	2.5	3.5			14	18
Lansing silt loam, 8 to 15 percent slopes	2.7	4.0					12	18
Lansing silt loam, 15 to 25 percent slopes	2.0	3.3					10	14
Lima silt loam, 0 to 3 percent slopes	3.8	4.5	3.0	4.0			16	20
Lima silt loam, 3 to 8 percent slopes	3.2	4.0	2.7	3.5			15	18
Lima silt loam, moderately deep variant, 0 to 3 percent slopes			3.0	3.8			14	17
Lima silt loam, moderately deep variant, 3 to 8 percent slopes	3.0	3.5	2.5	3.3			13	15
Lyons and Appleton silt loams, 0 to 3 percent slopes			2.5	3.5	2.0	3.0	8	16
Lyons and Kendaia silt loams, 0 to 3 percent slopes			2.5	3.5	2.0	3.0	8	18
Madalin silty clay loam					1.5	2.5		10
Made land, tillable	1.0	3.0	1.0	2.0	.8	1.5		
Manheim silt loam, 0 to 3 percent slopes			2.5	3.5	2.0	3.0	9	10
Manheim silt loam, 3 to 8 percent slopes			2.5	3.5	2.0	3.0	8	14
Manlius very shaly silt loam, 3 to 8 percent slopes		3.5		3.0				14
Manlius very shaly silt loam, 8 to 15 percent slopes		3.0		2.7				13
Manlius very shaly silt loam, 15 to 25 percent slopes		3.0		2.5				
Marilla shaly silt loam, 0 to 3 percent slopes				2.8		2.5		14
Marilla shaly silt loam, 3 to 8 percent slopes				2.7		2.5		13
Marilla shaly silt loam, 8 to 15 percent slopes				2.5		2.2		13
Middlebury silt loam				2.5	1.0	2.0		
Mohawk silt loam, 2 to 8 percent slopes	3.0	4.5	2.5	3.5			14	18
Mohawk silt loam, 8 to 15 percent slopes	2.7	4.0	2.3	3.3			12	16
Mohawk silt loam, 15 to 25 percent slopes	2.0	3.3					10	13
Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes	2.8	4.0	2.3	3.2			13	16
Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes	2.5	3.5					11	13
Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes	2.0	3.0					8	10
Niagara and Collamer silt loams, 0 to 2 percent slopes		3.5	2.2	3.5	1.5	2.5	10	17
Nunda silt loam, 3 to 8 percent slopes	3.0	4.2	2.5	3.5			14	17
Nunda silt loam, 8 to 15 percent slopes	2.7	4.0	2.3	3.3			12	16
Nunda silt loam, 15 to 25 percent slopes	2.0	3.3	2.0	3.0			10	14
Odessa silt loam, 0 to 2 percent slopes				3.5	2.0	3.0		14
Odessa silt loam, 2 to 6 percent slopes			2.0	3.5	2.0	3.0	8	14
Ontario loam, 0 to 3 percent slopes	3.2	5.0	2.5	3.6			15	20
Ontario loam, 3 to 8 percent slopes	3.0	4.5	2.5	3.5			14	18
Ontario loam, 8 to 15 percent slopes	2.7	4.0					12	16
Ontario loam, 15 to 25 percent slopes	2.0	3.5					10	14
Ontario stony loam, 2 to 8 percent slopes	2.3	4.0					10	13
Ontario stony loam, 8 to 15 percent slopes	2.0	3.5						
Ovid silt loam, 0 to 3 percent slopes				3.5	2.0	3.0	9	17
Ovid silt loam, 3 to 8 percent slopes			2.5	3.5	2.0	3.0	10	18
Palmyra gravelly loam, 0 to 3 percent slopes	3.2	5.0					15	20
Palmyra gravelly loam, 3 to 8 percent slopes	3.0	4.5					14	18
Palmyra gravelly loam, 8 to 15 percent slopes	2.7	4.0					12	16
Palmyra and Arkport soils, 15 to 25 percent slopes	2.0	3.5					10	14

yields of the principal crops—Continued

Corn for grain		Oats		Wheat		Sweet corn		Dry beans		Snap beans		Peas	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
80	115	60	70	40	50	4.0	6.0	25	35	2.5	3.5	1.8	2.8
50	70		50										
75	100	80	90	40	50	3.5	5.0	22	30	2.0	3.0	1.2	1.8
72	90	75	85	40	50	3.0	4.5	20	25	1.8	2.7	1.0	1.5
70	80	65	80	35	45	2.8	4.0	20	28	1.7	2.7	1.4	1.9
			60		25								
			50		20								
	80												
	80												
	50		55										
	100		70				5.0		30		3.0		2.5
	100						5.0		30		3.0		2.5
72		75	90			3.0	4.5	22	30	2.0	3.0	1.5	2.0
65		65	80										
60		50	70										
75	100	80	90	40	50	3.5	5.0	25	30	2.2	3.0	1.3	1.9
75	90	75	85	40	50	3.0	4.5	22	25	2.0	2.8	1.1	1.5
	75	80	85	35	40	2.8	4.3	23	28	2.0	2.5	1.0	1.8
	75	70	80	35	40	2.5	4.0	22	25	1.8	2.4	1.0	1.5
	80		80				5.0		30		3.0		2.2
	80		80				5.0		30		3.0		2.2
	50		50										
	75		75		30				30				
40	75		75		30				30				
	60	40	75	20	30								
		35	70		25								
		40	75										
		40	75	18	28								
		35	70		25								
72		75	90	40	50	3.0	4.5	22	30	2.0	3.0	1.5	2.0
65		65	80	32	40								
60	70	50	70	25	30								
60	80	70	85	35	45	2.5	4.0	20	28	1.8	2.7	1.3	1.8
55	70	60	75	30	35								
50	60	45	60	20	25								
55	85	60	80	20	35	2.5	5.0		30		3.0		2.0
70	90	70	80	40	50	3.0	4.5	22	30	2.0	3.0	1.5	2.0
65	80	65	80	32	40								
60	70	50	70	25	30								
			60				3.0		25		2.0		
			60		25		2.5		25		2.0		
75	100	75	90	40	50	3.5	5.0	24	32	2.3	3.3	1.6	2.2
72	90	75	90	40	50	3.0	4.5	22	30	2.0	3.0	1.5	2.0
65	80	65	80	32	40								
60	70	50	70	25	30								
60	80	70	80	35	45	2.7	3.7	20	28	1.8	2.7	1.4	1.8
		55	70	25	35								
	80	60	80		35		4.0		30		3.0		2.0
60	90	60	80	18	35		4.0		30		3.0		2.0
75	100	75	90	40	50	3.5	5.0	24	32	2.3	3.3	1.6	2.2
72	90	75	90	40	50	3.0	4.5	22	30	2.0	3.0	1.5	2.0
65	80	65	80	32	40								
60	70	50	70	25	30								

TABLE 1.—*Estimated average acre*

Soil	Forage mixtures (hay): Alfalfa-grass		Alfalfa-birdsfoot trefoil-grass		Birdsfoot trefoil-grass		Corn for silage	
	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Palmyra shaly silt loam, 0 to 3 percent slopes	3.2	5.0	--	--	--	--	16	20
Palmyra shaly silt loam, 3 to 8 percent slopes	3.0	4.5	--	--	--	--	15	18
Palmyra shaly silt loam, 8 to 15 percent slopes	2.8	4.0	--	--	--	--	12	16
Phelps and Fredon gravelly loams, 0 to 3 percent slopes	--	--	2.5	4.0	2.0	3.0	10	18
Phelps gravelly loam, 3 to 8 percent slopes	2.5	4.2	2.5	3.8	--	--	11	17
Remsen silt loam, 0 to 3 percent slopes	--	--	--	3.0	1.5	2.5	--	12
Remsen silt loam, 3 to 8 percent slopes	--	--	1.5	3.0	1.5	2.5	--	12
Remsen silt loam, 8 to 15 percent slopes	--	--	1.5	2.5	1.5	2.5	--	--
Remsen silty clay loam, 3 to 8 percent slopes, eroded	--	--	--	2.5	1.5	2.2	--	--
Remsen silty clay loam, 8 to 15 percent slopes, eroded	--	--	--	2.2	1.2	2.0	--	--
Remsen silty clay loam, 8 to 25 percent slopes, severely eroded	--	--	--	--	--	1.5	--	--
Remsen silty clay loam, 15 to 25 percent slopes, eroded	--	--	--	2.0	1.0	1.8	--	--
Rhinebeck silt loam	--	--	--	--	2.5	3.5	10	16
Romulus silt loam	--	--	--	--	2.0	3.0	--	16
Schoharie silt loam, 1 to 6 percent slopes	--	--	1.8	3.5	1.8	2.8	8	13
Schoharie silty clay loam, 6 to 12 percent slopes, eroded	--	--	1.5	2.8	1.6	2.5	--	--
Schoharie silty clay loam, 12 to 20 percent slopes, eroded	--	--	1.3	2.3	1.3	2.3	--	--
Scio silt loam, 2 to 8 percent slopes	2.5	4.0	2.0	3.5	--	--	10	18
Stafford loamy fine sand, 0 to 2 percent slopes	--	--	--	--	1.5	3.0	8	16
Wayland silt loam	--	--	--	--	2.0	3.3	--	22

The estimates in table 1 are given at two levels of management. In columns A are the yields that can be expected if the management of soils, water, and crops is average. This includes less than highly skilled use of crop rotations, lime and fertilizer, cultivation, artificial drainage, and other practices. It is estimated that yields at this level were obtained by the middle third of Genesee County growers during the mid-1960's.

The yields shown in columns B are those that can be expected under highly skilled, or improved, management. This management consists of using suitable crop rotations; using the best fertilizer and liming practices; providing adequate drainage and irrigation, where needed; using contour farming, stripcropping, sodded waterways, or other measures needed for conserving soil and water; thoroughly controlling weeds and insects; and tilling at the right time and in the right way.

For obtaining the yields in columns B, the management needed is that recommended in the annually revised editions of "Cornell Recommends for Field Crops" and "Cornell Recommends for Vegetable Crops." Yields at this level are approximately those obtained by about the top 25 percent of growers in Genesee County during the early 1960's.

In general, the most productive soils are those that are deep, medium textured, level to gently sloping, and well drained or moderately well drained. Finer textured soils are difficult to keep in good tilth, and moderately sloping to steep soils tend to be droughty. Wet, medium-textured or moderately fine textured soils are productive if they are adequately drained. They commonly have a greater capacity for supplying moisture than the better drained soils nearby.

Table 2 shows the estimated average acre yields of onions, lettuce, and potatoes grown on Muck, deep, and Muck, shallow. In addition to these crops, other specialty crops are well suited to muck and generally are grown on a limited acreage in the county.

TABLE 2.—*Estimated average yields of principal crops grown on muck*

[Yields in columns A are those obtained under average management; those in columns B are yields obtained under improved management. Dashed lines indicate crop is not commonly grown]

Land type	Onions		Lettuce		Potatoes	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Doz. hds.*	*Doz. hds.*	*Bu.*	*Bu.*
Muck, deep	600–800	800–1,200	1,300–1,500	1,500–1,800	--	--
Muck, shallow	500–700	700–1,000	--	--	300–400	400–500

yields of the principal crops—Continued

Corn for grain		Oats		Wheat		Sweet corn		Dry beans		Snap beans		Peas	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
80	100	75	90	40	50	3.6	5.0	24	32	2.3	3.3	1.6	2.3
75	90	75	90	40	50	3.2	4.5	22	30	2.3	3.0	1.5	2.0
68	80	70	80	32	40	---	---	---	---	---	---	---	---
60	90	60	80	20	35	2.5	5.5	18	30	1.8	3.5	1.3	2.5
50	80	60	80	25	35	2.5	5.0	20	30	2.0	3.5	1.5	2.5
---	---	40	60	---	20	---	---	---	---	---	---	---	---
---	---	40	60	---	25	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	45	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	70	---	50	---	25	---	5.0	20	30	2.5	3.0	---	---
---	80	---	50	---	---	---	4.0	---	---	---	2.8	---	---
---	70	35	55	20	30	---	3.5	---	28	---	2.5	---	---
---	70	---	40	---	25	---	---	---	---	---	---	---	---
---	---	---	35	---	20	---	---	---	---	---	---	---	---
55	85	65	80	30	35	2.0	4.5	20	30	1.5	3.0	.8	1.2
50	80	50	70	---	25	---	3.5	---	28	---	3.0	---	1.6
---	120	---	100	---	---	---	6.0	---	35	---	3.5	---	2.8

Beets produced on muck tend to be lighter colored than those produced on the uplands. They do well in areas of shallow muck that are well drained. Parsnips require deep muck. Dry beans grow well on either deep or shallow muck. Wheat is a well-suited crop, but lodging can be a serious problem. Boilers, a variety of onions, are grown for canning. Cabbage does well in well-drained areas of deep or shallow muck.

Tomatoes can be successfully grown, but a short-season variety is needed, preferably one that is determinate. Radishes are planted all season long and do well on deep or shallow muck that is well drained. Chinese cabbage is a very specialized crop, and the market for it is limited. Turnips, parsley, and broccoli can be profitably grown if a market is available. A favorable tonnage of sweet corn can be produced, but birds are a problem. A limited market is available for fresh spinach, a crop that requires better drainage than onions. Carrots, which are more tolerant of impeded drainage than spinach, are grown for a limited market on a contract basis.

Among the crops not suited to muck are strawberries, which may be damaged by frost early in fall, and snap beans, which produce an excessive growth of vines.

Use of Soils as Woodland

Woodland occupies about 20 percent of the land area, or 63,200 acres, in Genesee County. None of it is owned by the State of New York, but about 75 percent of the Tonawanda Indian Reservation is wooded. For the 13 towns in the county, the percentage of the total acreage that is woodland ranges from 16 to 30 percent.

On the reservation the average wooded area on farms is 11 acres in size. Elsewhere in the county, woodland occurs mainly as small woodlots, which average about 15 acres per farm. On many farms the wooded soils are sloping, are insufficiently drained, or are nontillable for other reasons. Income from the sale of forest products contributes little to the farm economy (*9*). On commercial forest land the average annual harvest is only 30 board feet per acre and is considerably less than the stands can produce. Light cutting has resulted in a fairly heavy stocking of timber.

Woodland suitability groups

To assist owners of woodland in planning the use of their soils, the soils of Genesee County have been placed in 22 woodland suitability groups. Each group is made up of soils that are similar in potential productivity, are suited to similar trees, and require similar management.

Listed in table 3 are the 22 woodland groups in the county. To find the names of the soil in any given group, refer to the "Guide to Mapping Units" at the back of this survey.

The potential productivity of the soils in a group is expressed as an adjective rating; good, fair, or poor. Each rating indicates the capacity of the soils to produce wood crops. Soils rated poor generally are not suitable for tree planting, except in areas where trees are needed to control erosion or to provide food and cover for wildlife.

Also given in the table are ratings of hazards and limitations that affect management, as well as lists of trees to use in plantings and trees to favor in natural stands (*5*, *10*, *14*). Some terms used in table 3 require explanation.

TABLE 3.—*Management*

Woodland suitability group	Potential productivity	Seedling mortality
Group 1: Deep, nearly level to moderately steep, well drained and moderately well drained soils that are medium textured or moderately coarse textured in the surface layer and subsoil; substratum is porous and permits root development; soils are medium acid to neutral in the surface layer but generally are calcareous between the depths of 20 and 48 inches.	Good	Slight
Group 2: Deep, moderately steep and steep, well drained and moderately well drained soils that are medium textured or moderately coarse textured in the surface layer and subsoil; substratum is porous and permits root development; soils are medium acid to neutral in the surface layer but generally are calcareous between the depths of 20 and 48 inches.	Good	Slight
Group 3: Well drained and moderately well drained, medium-textured, medium-lime soils that are nearly level to moderately steep; in most places the zone of maximum rooting is good to fair to a depth of about 36 inches; the dense substratum restricts the movement of air and water and the growth of roots; soils are medium acid or strongly acid in the surface layer but are nearly neutral or calcareous below a depth of 36 inches.	Good	Slight
Group 4: Well drained and moderately well drained, medium-textured, medium-lime soils that are moderately steep or steep; in most places the zone of maximum rooting is good to fair to a depth of about 36 inches; the dense substratum restricts the movement of air and water and the growth of roots; soils are medium acid or strongly acid in the surface layer but are nearly neutral or calcareous below a depth of 36 inches.	Good	Slight
Group 5: Well drained and moderately well drained, medium-textured, high-lime soils that are nearly level to moderately steep and are more than 20 inches deep over bedrock; the surface layer and subsoil are fairly permeable, but the calcareous substratum is firm and dense and restricts root development; surface layer is slightly acid or neutral.	Good	Slight
Group 6: Deep, nearly level to moderately sloping, well drained and moderately well drained soils that are medium textured in the surface layer and subsoil; the substratum is porous and permits root development; soils are medium acid or strongly acid throughout.	Good	Slight
Group 7: Gently sloping and moderately sloping, excessively drained to moderately well drained soils that are sandy and porous throughout; the surface layer and subsoil are strongly acid or medium acid, but the pH may increase in the underlying layers, especially in the lower substratum; drainage is only moderately good in the Elnora soil because the water table is seasonally high.	Fair or good	Moderate
Group 8: Deep, moderately well drained and well drained, medium- and high-lime soils that are nearly level to moderately steep; the surface layer is loamy or clayey; the subsoil is well structured and clayey; soils are medium acid or slightly acid in the surface layer, but they are calcareous in the lower layers.	Fair or good	Slight
Group 9: Deep, moderately well drained and well drained, medium- and high-lime soils that are moderately steep or steep; the surface layer is loamy or clayey; the subsoil is well structured and clayey; soils are medium acid or slightly acid in the surface layer, but they are calcareous in the lower layers.	Fair or good	Slight
Group 10: Somewhat poorly drained and moderately well drained, nearly level, medium-textured soils that contain lime; although the subsoil and substratum permit rooting, the actual depth of rooting depends on the height of the water table; soils are medium acid to neutral in the surface layer but are calcareous in the lower layers.	Fair or good	Slight or moderate.
Group 11: Well-drained and somewhat excessively drained, gently sloping to moderately steep soils that are strongly acid and very shaly; fissile shale bedrock generally occurs at a depth of 30 inches or less.	Fair	Slight
Group 12: Well-drained and somewhat excessively drained, moderately steep and steep soils that are strongly acid and very shaly; fissile shale bedrock generally occurs at a depth of 30 inches or less.	Fair	Slight
Group 13: Moderately well drained, strongly acid, medium-textured soils that are nearly level to moderately sloping; at a depth of 18 to 24 inches, they have a very dense fragipan or substratum that restricts rooting and the movement of air and water.	Fair	Slight

of the soils as woodland

Plant competition	Equipment limitation	Erosion hazard	Windthrow hazard	Suitable trees	
				Favored for planting	Favored in existing stands
Moderate	Slight or moderate.	Slight or moderate.	Slight	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, red oak, black walnut, white ash.
Slight or moderate.	Moderate or severe.	Moderate or severe.	Slight	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, red oak, black walnut, white ash.
Moderate	Slight or moderate.	Slight or moderate.	Slight	Scotch pine, red pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, red oak, black walnut, white ash.
Moderate	Moderate or severe.	Moderate or severe.	Slight	Scotch pine, red pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, red oak, black walnut, white ash.
Severe	Slight or moderate.	Slight or moderate.	Moderate	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, red oak, black walnut, white ash.
Slight	Slight	Slight	Slight	Scotch pine, red pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, red oak, white pine.
Moderate	Slight	Slight or moderate.	Slight	Scotch pine, red pine, white pine, European larch, Japanese larch.	Black cherry, sugar maple, white ash, red oak.
Moderate or severe.	Slight or moderate.	Slight or moderate.	Slight	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, white ash, white pine.
Moderate or severe.	Moderate or severe.	Moderate or severe.	Slight	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Black cherry, sugar maple, white ash, white pine.
Moderate or severe.	Slight or moderate.	Slight	Slight	Scotch pine, Japanese larch, Norway spruce, white spruce.	Sugar maple, white ash, white pine.
Slight	Slight or moderate.	Slight or moderate.	Slight	Scotch pine, red pine, white pine, European larch.	Sugar maple, red oak, white pine.
Slight	Moderate or severe.	Moderate	Slight	Scotch pine, red pine, white pine, European larch.	Sugar maple, red oak, white pine.
Slight	Slight	Slight	Moderate	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Sugar maple, white pine.

TABLE 3.—*Management of the*

Woodland suitability group	Potential productivity	Seedling mortality
Group 14: Somewhat poorly drained, nearly level soils that are sandy in the upper layers but may be finer textured below a depth of 40 inches; although the subsoil is rapidly permeable, it is waterlogged in spring and during prolonged wet periods; soils are medium acid or strongly acid in the surface layer and are medium acid to neutral in the subsoil.	Fair	Slight
Group 15: Somewhat poorly drained, nearly level and gently sloping, medium-textured soils that contain lime; the dense substratum restricts rooting and is seasonally wet; soils generally are slightly acid or neutral in the surface layer, but they are calcareous in the lower layers.	Fair	Moderate
Group 16: Somewhat poorly drained, nearly level to moderately steep soils that have a loamy or somewhat clayey surface layer and are well structured and clayey in the subsoil and substratum; the subsoil is waterlogged in spring and during prolonged wet periods; soils are medium acid to neutral in the surface layer, but the pH increases with depth, and the substratum is calcareous.	Fair	Moderate
Group 17: Somewhat poorly drained and moderately well drained, nearly level to moderately steep, strongly acid soils; the Fremont soils contain a large amount of silt and a fair amount of clay; the Hornell soils are clayey; in all the soils the slowly permeable subsoil and substratum are waterlogged in spring and during wet periods.	Fair	Moderate
Group 18: Poorly drained to moderately well drained, nearly level to moderately sloping soils that are clayey and strongly acid; they are underlain by shale bedrock at a depth of 24 to 40 inches; the root zone is limited because the subsoil is waterlogged for long periods in spring and during spells of rainy weather; some of the soils are eroded.	Fair	Moderate
Group 19: Excessively drained, very high lime, medium-textured soils that are nearly level to moderately steep; they are less than 20 inches deep over limestone bedrock.	Fair or poor	Moderate or severe.
Group 20: Medium-textured, nearly level and gently sloping soils that generally are poorly drained or very poorly drained; rooting is restricted mainly by a high water table; the surface layer is medium acid to neutral, but the pH increases with depth, and in most places the substratum is calcareous; the Appleton and Kendaia soils are somewhat poorly drained.	Poor or fair	Severe
Group 21: Depressional mucks, peats, and mineral soils having a mucky surface layer; except on the drier hummocks and in drained areas, the soils of this unit generally are too wet for planting trees.	Poor	Moderate or severe.
Group 22: Soils and land types that vary widely in slope, depth, texture, and other characteristics; each site must be examined to determine its suitability for planting and for managing as woodland.		

Seedling mortality refers to the expected degree of mortality of naturally occurring or planted seedlings as influenced by soil texture, depth, drainage, flooding, height of the water table, and degree of erosion. Normal rainfall, good planting stock, and proper planting are assumed. Mortality is *slight* if the expected loss is less than 25 percent; *moderate*, 25 to 50 percent; or *severe*, more than 50 percent.

Plant competition refers to the invasion or growth of unwanted trees, shrubs, vines, or other plants when openings are made in the canopy. Competition is *slight* if it does not hinder the establishment of a desirable stand of trees. It is *moderate* if competing plants delay the establishment of a desirable stand. Competition is *severe* if it prevents the establishment of a desirable stand unless intensive cultural measures are applied. Among the soil properties that affect plant competition are available moisture capacity, degree of erosion, and drainage.

The ratings for equipment limitations are based on the degree that soils and topographic features restrict or prohibit the use of equipment normally employed in tending a crop of trees or in harvesting the trees. The limitation is *slight* if there is little or no restriction on the type of equipment that can be used or the time of year that equipment can be used. It is *moderate* if the use of equipment is seasonally limited or if modified equipment or methods of harvesting are needed. The limitation is *severe* if special equipment is needed or if the use of such equipment is severely restricted by one or more unfavorable soil characteristics. Limitations on the use of equipment are affected by the degree of slope, height of the water table, rockiness, and soil texture.

Erosion hazard is rated according to the risk of erosion on woodland where normal practices are used in managing and harvesting the trees. It is *slight* if erosion control is not an important concern. The hazard is *moderate* if some attention must be given to check soil losses. It is *severe* if special treatment or special methods of operation are necessary for minimizing erosion.

Windthrow hazard depends on the development of roots and the capacity of soils to hold trees firmly. The hazard is *slight* if windthrow is no special concern. It is *moderate* if roots hold the trees firmly, except when the soil is excessively wet or when the wind is strongest. The hazard

soils as woodland—Continued

Plant competition	Equipment limitation	Erosion hazard	Windthrow hazard	Suitable trees	
				Favored for planting	Favored in existing stands
Moderate or severe.	Moderate	Slight	Moderate	Japanese larch, Norway spruce, white spruce, northern white-cedar.	Sugar maple, white pine, red maple, hemlock.
Severe	Moderate	Slight	Slight	Japanese larch, Norway spruce, white spruce.	Red maple, sugar maple, basswood.
Severe	Moderate	Slight or moderate.	Slight	Northern white-cedar	Sugar maple, red maple, white ash.
Moderate	Moderate	Slight or moderate.	Slight or moderate.	Scotch pine, white pine, European larch, Japanese larch, Norway spruce, white spruce.	Sugar maple, white ash, basswood.
Slight	Slight or moderate.	Moderate or severe.	Slight	Norway spruce, white spruce.	Red maple, sugar maple, white ash.
Slight	Moderate	Slight	Moderate or severe.	Northern white-cedar, redcedar (use limited).	Sugar maple, black cherry, white oak.
Severe	Severe	Slight	Slight or moderate.	Norway spruce, white spruce, northern white-cedar (use limited).	Red maple, black ash.
Severe	Severe	Slight	Moderate	White spruce (use limited), northern white-cedar.	Red maple, white oak, black ash.

is *severe* if many trees are expected to be blown over because their roots do not provide enough stability.

Wildlife [4]

Genesee County is located almost entirely in the Lake Plains Region, but a small part along the southern edge is in the foothills of the Allegheny Plateau. Wildlife is an important natural resource of the county. Ring-neck pheasant, cottontail rabbit, and white-tailed deer are abundant. In addition, the county has a limited squirrel population and a few ruffed grouse. Waterfowl are becoming increasingly important through the development and management of Federal and State waterfowl refuges in the northwestern part of the county. The Bergen Swamp Preservation Society maintains a wildlife sanctuary in the northeastern part of the county.

The welfare of a wildlife species depends on the amount and distribution of food, shelter, and water. If any of these elements is missing, inadequate, or inaccessible, the species is absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to land use, to the resulting kinds and patterns of vegetation, and to the supply and distribution of water. These, in turn, are generally related to the kinds of soils.

Habitat for wildlife normally can be created or improved by planting suitable vegetation, by properly managing the existing plant cover, by fostering the natural establishment of desirable plants, or by using a combination of these measures.

This subsection rates the soils of Genesee County according to their suitability for eight elements of wildlife habitat and for three classes of wildlife (*1*). Then, it explains the ratings and explains the elements and the classes of wildlife.

Uses of suitability ratings

The suitability ratings in this subsection can be used as an aid in—

1. Planning the broad use of parks, refuges, nature-study areas, and other recreational developments for wildlife.

[4] This subsection was prepared by ROBERT E. MYERS, wildlife biologist, Soil Conservation Service, Syracuse.

2. Selecting the better soils for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative intensity of management needed for individual habitat elements.
4. Eliminating sites that would be difficult or not feasible to manage for specific kinds of wildlife.
5. Determining areas that are suitable for acquisition for use by wildlife.

Habitat elements and classes of wildlife

Table 4 lists the soils in the county and rates their suitability for eight elements of wildlife habitat and for three classes, or groups, of wildlife (*1*). The ratings are 1, 2, 3, and 4, each number indicating relative suitability. A rating of 1 denotes well suited; 2 denotes suited; 3, poorly suited; and 4, not suited. Soils that are well suited have few limitations, those that are suited have moderate limitations, and those that are poorly suited have severe limitations. Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

The elements of wildlife habitat are discussed in the following paragraphs.

Habitat Elements

Each soil is rated in table 4 according to its suitability for various kinds of plants and other elements that make up wildlife habitat.

Grain and seed crops.—These crops include such seed-producing annuals as corn, sorghum, wheat, barley, oats, millet, buckwheat, and sunflower. Soils well suited to these plants are deep, nearly level or very gently sloping, medium textured, well drained, and free or nearly free of stones. They have high moisture-holding capacity and are not subject to frequent flooding. These soils can be safely planted to the named crops each year, but the ones that are not so well suited require more intensive management.

Grasses and legumes.—Making up this group are domestic grasses and legumes that are established by planting. Among the plants are bluegrass, fescue, brome, timothy, orchardgrass, reed canarygrass, clover, trefoil, and alfalfa. On soils that are rated well suited, many kinds of plants that are suited to the climate can be maintained in adequate stands for at least 10 years. These soils have slopes of 0 to 15 percent, are well drained or moderately well drained, and have moderately high or high moisture-holding capacity. Occasional flooding and surface stones are not serious concerns, for the soils are seldom tilled.

Wild herbaceous upland plants.—In this group are perennial grasses and weeds that generally are established naturally. They include bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. Soils that are well suited to these plants vary widely in texture, drainage, and slope. If drainage ranges between good and somewhat poor, slope is not limiting. Stoniness and occasional flooding are not serious concerns.

Hardwood plants.—These plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally but may be planted. Among the native kinds are oak, beech, cherry, maple, birch, poplar, apple, hawthorn, dogwood, virburnum, grape, and briers. Soils well suited to these plants are deep or moderately deep, medium textured or moderately fine textured, and moderately well drained to somewhat excessively drained. Slope and surface stoniness are of little significance.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky cornel dogwood are some of the shrubs that generally are available and can be planted on soils that are rated well suited. In addition, highbush cranberry and silky cornel dogwood can be planted on soils that have a rating of

TABLE 4.—*Rating of Genesee County soils for*

[Ratings 1, 2, 3, and 4 are explained in the text. Not rated are

Map symbol	Soil name	Wildlife habitat elements: Grain and seed crops	Wildlife habitat elements: Grasses and legumes
Ad	Alden mucky silt loam	4	3
AeA	Allis silty clay loam, deep, 0 to 4 percent slopes	3	2
AnA	Angola silt loam, 0 to 3 percent slopes	2	2
AnB	Angola silt loam, 3 to 8 percent slopes	2	2
ApB	Appleton silt loam, 3 to 8 percent slopes	2	2
ArB	Arkport very fine sandy loam, 1 to 6 percent slopes	2	2
ArC	Arkport very fine sandy loam, 6 to 12 percent slopes	2	2
AsD	Arkport and Dunkirk soils, 12 to 20 percent slopes	3	2
AsE	Arkport and Dunkirk soils, 20 to 40 percent slopes	4	4
BeB	Benson soils, 0 to 8 percent slopes	3	3
BeD	Benson soils, 8 to 25 percent slopes	3	3
BeE	Benson soils, 25 to 40 percent slopes	4	3
BuA	Burdett silt loam, 0 to 3 percent slopes	2	2
BuB	Burdett silt loam, 3 to 8 percent slopes	2	2
CaA	Canandaigua silt loam, 0 to 2 percent slopes	3	2

See footnote at end of table.

suited. Hardwoods that are not available commercially can commonly be transplanted successfully.

Coniferous wildlife habitat.—This element consists of cone-bearing, evergreen trees and shrubs that are used by wildlife primarily as cover, though they also provide browse and seeds. Among them are Norway spruce, pine, white-cedar, hemlock, and juniper. Generally, the plants are established naturally in areas where the cover of weeds and sod is thin. Well-suited soils are those on which plants grow slowly and delay closing the canopy. It is important that branches be maintained close to the ground so that food and cover are readily available to rabbits, pheasant, and other small animals. If the trees quickly form a dense canopy that shuts out the light, the lower branches die.

On soils poorly suited as coniferous wildlife habitat, widely spaced conifers may quickly but only temporarily produce the desired growth. Maintaining these plants is difficult because the soils are well suited to hardwood plants. Unless the stand is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants.—Making up this group are wild, herbaceous, annual and perennial plants that grow on moist to wet sites. They include smartweed, wild millet, rush, bulrush, spikerush, sedges, burreed, wildrice, rice cutgrass, mannagrass, and cattails. Soils having a rating of well suited are nearly level and poorly drained or very poorly drained. Soils with a rating of suited are nearly level and are somewhat poorly drained or frequently flooded. Depth, stoniness, and texture of the surface layer are of little concern.

Shallow water developments.—This element is rated on the basis of the soil being suitable for the construction of a low dike to impound shallow water. Marshy areas in which runoff is the only source of water are a common type of shallow water development. Similarly, areas flooded for duck fields are dry, shallow impoundments when domestic grains are grown in summer. The fields are flooded in fall, and the grain is covered to a depth of 18 inches by water supplied from an adjacent pond or stream.

Soils that are rated well suited to this use are nearly level (0 to 1 percent slopes), more than 36 inches deep to bedrock, and poorly drained or very poorly drained. Soils having a rating of suited are nearly level, 20 to 36 inches deep to bedrock, and somewhat poorly drained.

Excavated impoundments.—These impoundments are mainly dug-out areas more than 6 feet deep that are used for the production of fish or for recreation. Other areas of this element are level ditches, shallow excavations, and potholes that are created to improve the habitat for wetland wildlife, particularly waterfowl. The impoundments depend chiefly on a high water table as a source of water, but they may also receive runoff. Their suitability for fish depends on the depth, quality, temperature, and other features of the water. The depth should be at least 6 feet.

Nearly level, poorly drained and very poorly drained soils that are more than 72 inches deep and have a fairly stable high water table are well suited, provided they are not flooded frequently and have few or no limitations for the construction of deep dug-out impoundments. As the slope of the site increases, the difficulty or limitation in constructing the impoundment increases.

Classes of Wildlife

Table 4 rates the soils according to their suitability for three classes of wildlife in the county—openland, woodland, and wetland wildlife.

Openland wildlife.—Examples of openland wildlife are pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife.—Among the birds and mammals that prefer woodland are ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray and red squirrels, gray fox, white-tailed deer, raccoon, and wild turkey. They obtain

wildlife habitat elements and classes of wildlife

Alluvial land (Al); Made land, tillable (Md); and Made land and Dumps (Me)]

Wildlife habitat elements—Continued						Classes of wildlife		
Wild herbaceous upland plants	Hardwood plants	Coniferous wildlife habitat	Wetland food and cover plants	Shallow water developments [1]	Excavated impoundments [1]	Openland	Woodland	Wetland
3	3	1	1	1	1	4	3	1
2	2	2	1	1	1	2	1	1
2	2	3	2	2	4	2	3	2
2	2	3	3	4	4	2	3	2
1	1	3	3	4	4	1	2	4
2	2	3	4	4	4	2	3	4
2	2	3	4	4	4	2	3	4
2	2	3	4	4	4	2	3	4
2	2	3	4	4	4	3	3	4
3	3	2	4	4	4	3	3	4
3	3	2	4	4	4	3	3	4
3	3	2	4	4	4	4	3	4
1	1	3	2	2	2	1	2	2
1	1	3	3	4	4	1	2	4
2	2	2	1	1	1	2	2	1

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TABLE 4.—*Rating of Genesee County soils for wildlife*

Map symbol	Soil name	Wildlife habitat elements: Grain and seed crops	Wildlife habitat elements: Grasses and legumes
CdA	Canandaigua mucky silt loam, 0 to 2 percent slopes	4	3
CeA	Cazenovia silt loam, 0 to 3 percent slopes	2	1
CeB	Cazenovia silt loam, 3 to 8 percent slopes	2	1
CeC	Cazenovia silt loam, 8 to 15 percent slopes	2	1
CgC3	Cazenovia silty clay loam, 8 to 15 percent slopes, eroded	3	2
CgD3	Cazenovia silty clay loam, 15 to 25 percent slopes, eroded	4	3
ChA	Chenango shaly silt loam, 0 to 3 percent slopes	1	1
ChB	Chenango shaly silt loam, 3 to 8 percent slopes	2	1
CnC	Chenango shaly silt loam, 8 to 15 percent slopes	2	1
C B	Collamer silt loam, 2 to 6 percent slopes	2	1
CmB	Colonie loamy fine sand, 2 to 6 percent slopes	3	3
CmC	Colonie loamy fine sand, 6 to 12 percent slopes	3	3
CoA	Conesus silt loam, 0 to 3 percent slopes	2	1
CoB	Conesus silt loam, 3 to 8 percent slopes	2	1
CoC	Conesus silt loam, 8 to 15 percent slopes	2	1
DaA	Darien silt loam, 0 to 3 percent slopes	3	2
DaB	Darien silt loam, 3 to 8 percent slopes	3	2
DaC	Darien silt loam, 8 to 15 percent slopes	3	2
DaD	Darien silt loam, 15 to 25 percent slopes	3	2
DuB	Dunkirk silt loam, 2 to 6 percent slopes	2	1
DuC	Dunkirk silt loam, 6 to 12 percent slopes	2	1
Ed	Edwards muck	4	3
Ee	Eel silt loam	2	1
ElB	Elnora loamy fine sand, 2 to 6 percent slopes	3	2
Fo	Fonda mucky silt loam	4	3
FrA	Fremont silt loam, 0 to 3 percent slopes	3	2
FrB	Fremont silt loam, 3 to 8 percent slopes	3	2
FrC	Fremont silt loam, 8 to 15 percent slopes	3	2
Fw	Fresh water marsh	4	4
GmA	Galen and Minoa very fine sandy loams, 0 to 2 percent slopes:		
	Galen very fine sandy loam	2	2
	Minoa very fine sandy loam	3	2
GnB	Galen very fine sandy loam, 2 to 6 percent slopes	2	1
Gs	Genesee silt loam	2	1
HaA	Halsey silt loam, 0 to 4 percent slopes	3	2
HlA	Hilton loam, 0 to 3 percent slopes	2	1
HlB	Hilton loam, 3 to 8 percent slopes	2	1
Hm	Holly silt loam	3	2
HnB	Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes	2	1
HoB3	Hornell silty clay loam, 3 to 8 percent slopes, eroded	3	3
HoC3	Hornell silty clay loam, 8 to 15 percent slopes, eroded	3	3
HsD3	Hornell and Fremont soils, 15 to 25 percent slopes, eroded	4	3
IoA	Ilion silt loam, 0 to 3 percent slopes	3	2
IoB	Ilion silt loam, 3 to 8 percent slopes	3	2
KeA	Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes	2	2
La	Lakemont silty clay loam	3	2
Ld	Lamson very fine sandy loam	3	2
Le	Lamson mucky very fine sandy loam	4	3
LgB	Lansing silt loam, 3 to 8 percent slopes	2	1
LgC	Lansing silt loam, 8 to 15 percent slopes	2	1
LgD	Lansing silt loam, 15 to 25 percent slopes	3	2
LmA	Lima silt loam, 0 to 3 percent slopes	2	1
LmB	Lima silt loam, 3 to 8 percent slopes	2	1
LnA	Lima silt loam, moderately deep variant, 0 to 3 percent slopes	2	1
LnB	Lima silt loam, moderately deep variant, 3 to 8 percent slopes	2	1
LoA	Lyons and Appleton silt loams, 0 to 3 percent slopes:		
	Lyons silt loam	3	2
	Appleton silt loam	2	2
LpA	Lyons and Kendaia silt loams, 0 to 3 percent slopes:		
	Lyons silt loam	3	2
	Kendaia silt loam	2	2
Ma	Madalin silty clay loam	3	2
MhA	Manheim silt loam, 0 to 3 percent slopes	2	2
MhB	Manheim silt loam, 3 to 8 percent slopes	2	2
MlB	Man'ius very shaly silt loam, 3 to 8 percent slopes	2	1
MlC	Manlius very shaly silt loam, 8 to 15 percent slopes	2	1
MlD	Manlius very shaly silt loam, 15 to 25 percent slopes	3	2
MlE	Manlius very shaly silt loam, 25 to 40 percent slopes	4	3

habitat elements and classes of wildlife—Continued

Wildlife habitat elements—Continued						Classes of wildlife		
Wild herbaceous upland plants	Hardwood plants	Coniferous wildlife habitat	Wetland food and cover plants	Shallow water developments [1]	Excavated impoundments [1]	Openland	Woodland	Wetland
3	3	1	1	1	1	4	3	1
1	1	3	3	2	3	1	1	3
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
2	2	2	4	4	4	3	2	4
2	2	2	4	4	4	3	2	4
1	1	3	3	3	3	1	1	3
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
2	2	3	2	2	2	2	3	2
2	2	3	3	4	4	2	3	4
2	2	3	4	4	4	2	3	4
2	2	3	4	4	4	2	3	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
3	3	3	2	1	1	4	4	1
1	1	3	3	3	3	1	1	3
2	1	3	4	4	4	2	2	4
3	3	1	1	1	1	4	3	1
2	2	3	2	2	2	2	3	2
2	2	3	3	4	4	2	3	4
2	2	3	4	4	4	2	3	4
4	4	4	1	1	1	4	4	1
1	1	3	3	3	3	1	1	3
2	2	3	2	2	2	2	3	2
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
2	2	2	1	1	1	2	2	1
1	1	3	3	3	3	1	1	3
1	1	3	4	4	4	1	1	4
2	1	2	1	2	3	2	1	1
1	1	3	4	4	4	1	1	4
1	1	3	3	4	4	2	2	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	3	2	4
2	1	2	1	1	1	2	1	1
2	1	2	3	4	4	2	1	4
1	1	3	2	2	4	1	2	2
2	2	2	1	1	1	2	2	1
2	2	2	1	1	1	2	2	1
3	3	1	1	1	1	4	3	1
1	1	3	4	4	3	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	3	3	3	1	1	3
1	1	3	4	4	4	1	1	4
1	1	3	3	3	4	1	1	3
1	1	3	4	4	4	1	1	4
2	2	2	1	1	1	2	2	1
1	1	3	2	2	2	1	2	2
2	2	2	1	1	1	2	2	1
1	1	3	2	2	2	1	2	2
2	2	2	1	1	1	2	2	1
1	1	3	2	2	2	1	2	2
1	1	3	3	4	4	1	2	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	3	2	4

TABLE 4.—*Rating of Genesee County soils for wildlife*

Map symbol	Soil name	Wildlife habitat elements	
		Grain and seed crops	Grasses and legumes
MmA	Marilla shaly silt loam, 0 to 3 percent slopes	2	1
MmB	Marilla shaly silt loam, 3 to 8 percent slopes	2	1
MmC	Marilla shaly silt loam, 8 to 15 percent slopes	2	1
Mn	Middlebury silt loam	2	1
MoB	Mohawk silt loam, 2 to 8 percent slopes	2	1
MoC	Mohawk silt loam, 8 to 15 percent slopes	2	1
MoD	Mohawk silt loam, 15 to 25 percent slopes	3	2
MpB	Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes	2	1
MpC	Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes	2	1
MpD	Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes	3	2
Mr	Muck, deep	4	3
Ms	Muck, shallow	4	3
NaA	Niagara and Collamer silt loams, 0 to 2 percent slopes:		
	Niagara silt loam	2	2
	Collamer silt loam	2	1
NuB	Nunda silt loam, 3 to 8 percent slopes	2	1
NuC	Nunda silt loam, 8 to 15 percent slopes	2	1
NuD	Nunda silt loam, 15 to 25 percent slopes	3	2
OdA	Odessa silt loam, 0 to 2 percent slopes	2	2
OdB	Odessa silt loam, 2 to 6 percent slopes	2	2
OnA	Ontario loam, 0 to 3 percent slopes	1	1
OnB	Ontario loam, 3 to 8 percent slopes	2	1
OnC	Ontario loam, 8 to 15 percent slopes	2	1
OnD	Ontario loam, 15 to 25 percent slopes	3	2
OrE	Ontario and Lansing soils, 25 to 40 percent slopes	4	3
OsB	Ontario stony loam, 2 to 8 percent slopes	3	2
OsC	Ontario stony loam, 8 to 15 percent slopes	3	2
OvA	Ovid silt loam, 0 to 3 percent slopes	2	2
OvB	Ovid silt loam, 3 to 8 percent slopes	2	2
PaA	Palmyra gravelly loam, 0 to 3 percent slopes	1	1
PaB	Palmyra gravelly loam, 3 to 8 percent slopes	2	1
PaC	Palmyra gravelly loam, 8 to 15 percent slopes	2	1
PkD	Palmyra and Arkport soils, 15 to 25 percent slopes	3	2
PkE	Palmyra and Arkport soils, 25 to 40 percent slopes	4	3
PlA	Palmyra shaly silt loam, 0 to 3 percent slopes	1	1
PlB	Palmyra shaly silt loam, 3 to 8 percent slopes	2	1
PlC	Palmyra shaly silt loam, 8 to 15 percent slopes	2	1
PrA	Phelps and Fredon gravelly loams, 0 to 3 percent slopes:		
	Phelps gravelly loam	2	1
	Fredon gravelly loam	2	2
PsB	Phelps gravelly loam, 3 to 8 percent slopes	2	1
ReA	Remsen silt loam, 0 to 3 percent slopes	2	2
ReB	Remsen silt loam, 3 to 8 percent slopes	2	2
ReC	Remsen silt loam, 8 to 15 percent slopes	2	2
RmB3	Remsen silty clay loam, 3 to 8 percent slopes, eroded	3	3
RmC3	Remsen silty clay loam, 8 to 15 percent slopes, eroded	3	3
RmC4	Remsen silty clay loam, 8 to 25 percent slopes, severely eroded	4	3
RmD3	Remsen silty clay loam, 15 to 25 percent slopes, eroded	4	3
RnE	Remsen soils, 25 to 40 percent slopes	4	3
RnE4	Remsen soils, 25 to 40 percent slopes, severely eroded	4	4
Ro	Rhinebeck silt loam	2	2
Rr	Rockland, limestone	4	4
Rs	Romulus silt loam	3	2
SeB	Schoharie silt loam, 1 to 6 percent slopes	2	1
ShC3	Schoharie silty clay loam, 6 to 12 percent slopes, eroded	3	2
ShD3	Schoharie silty clay loam, 12 to 20 percent slopes, eroded	4	3
SlE3	Schoharie soils, 20 to 40 percent slopes, eroded	4	4
SmB	Scio silt loam, 2 to 8 percent slopes	2	1
Sn	Sloan silt loam	4	3
StA	Stafford loamy fine sand, 0 to 2 percent slopes	3	2
Wa	Wayland silt loam	3	2
Wr	Warners loam	4	3

[1] At the site of a proposed shallow water development or an excavated impoundment, a detailed investigation is needed to determine feasibility. Table 7 in the subsection "Engineering Applications" lists the soil features that affect construction of the reservoir area and embankment of farm ponds.

habitat elements and classes of wildlife—Continued

Wildlife habitat elements—Continued						Classes of wildlife		
Wild herbaceous upland plants	Hardwood plants	Coniferous wildlife habitat	Wetland food and cover plants	Shallow water developments [1]	Excavated impoundments [1]	Openland	Woodland	Wetland
1	1	3	3	3	3	1	1	3
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	3	3	3	1	1	3
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
4	3	1	2	3	1	4	4	2
4	3	1	2	2	1	4	4	2
1	1	3	2	2	2	1	2	2
1	1	3	3	3	3	1	1	3
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	2	2	2	1	2	2
1	1	3	3	4	4	1	2	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	2	2	4
2	1	3	2	2	2	2	2	2
2	1	3	3	4	4	2	2	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
2	2	2	4	4	4	3	2	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	1	1	4
1	1	3	3	3	3	1	1	3
1	1	3	2	2	2	1	2	2
1	1	3	4	4	4	1	1	4
1	1	3	2	2	2	1	2	2
1	1	3	3	4	4	1	2	4
1	1	3	4	4	4	1	2	4
1	1	3	3	4	4	2	2	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	3	2	4
1	1	3	2	2	2	1	2	2
3	3	1	4	4	4	4	3	4
2	1	2	1	1	1	2	1	1
1	1	3	4	4	4	1	1	4
1	1	3	4	4	4	2	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	3	2	4
1	1	3	4	4	4	1	1	4
3	1	1	1	2	3	3	2	1
2	3	3	2	2	2	2	3	2
2	2	2	1	2	3	2	2	1
3	2	1	1	3	4	3	2	2

food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

Wetland wildlife.—Ducks, geese, rails, herons, shore birds, mink, muskrat, and beaver are familiar examples of birds and mammals that normally make their home in wet areas, such as ponds, marshes, and swamps.

Each rating under "Classes of wildlife" in table 4 is based on the ratings listed for the habitat elements in the first part of the table. For openland wildlife the rating is based on the ratings shown for grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous wildlife habitat. The rating for woodland wildlife is based on the ratings listed for all the elements except grain and seed crops. For wetland wildlife the rating is based on the ratings shown for wetland food and cover plants, shallow water developments, and excavated impoundments.

Engineering Applications [5]

This soil survey for Genesee County, New York, though made primarily for farm use, has considerable value for other uses. Some soil properties are of special interest to engineers because they affect the design, construction, and maintenance of roads, airports, pipelines, building foundations, and sewage disposal systems. The properties most important to the engineer are permeability to water, shear strength, grain size, compaction characteristics, soil drainage, plasticity, and pH. Relief, depth to water table, and depth to and kind of bedrock are important as well.

Information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, commercial, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations of the selected locations.
4. Locate probable sources of gravel and other construction material.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining similar structures on like soils.
6. Determine the suitability of soil units for cross-country movements of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and from aerial photographs for the purpose of making maps and reports that can be used readily by engineers and others.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations in this subsection can be useful for many purposes. It should be strongly emphasized, however, that the interpretations generally will not eliminate the need for subsurface investigation, subsequent testing, and engineering analysis at the site of the proposed engineering works. In most places the intensity of investigation needed is proportional to the weight of the loads to be applied, to the depth and amount of earthwork involved, and to the cost of the contemplated works. Nevertheless, the engineering subsection and the soil map, together with the soil descriptions, are useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Additional information about the soils in the county can be obtained by referring to other parts of this survey, particularly the sections "Descriptions of the Soils," "Formation, Morphology, and Classification of Soils," and "Geology."

Terminology

Some of the terms used by soil scientists may be unfamiliar to engineers, and some words—for example, soil, clay, silt, sand, aggregate, and granular—may have a special meaning to soil scientists. These and other special terms are defined in the Glossary at the back of the survey. Following are definitions of several terms that are used in this section of the survey and may be unfamiliar.

Bearing Capacity.—The unit load that can be placed on a soil without detrimental deformation to the structure that is supported. It is generally expressed in tons or pounds per square foot. In this survey the adjective ratings given for bearing capacity are estimated and should not be used to assign specific values of bearing capacity.

Compressibility.—The capability of a soil to be compressed by a superimposed load.

Liquid Limit.—The moisture content at which the soil material passes from a plastic to a viscous, semiliquid state.

Moisture Content.—The ratio of the weight of water contained in the soil to the dry weight of the soil. It is generally expressed as a percentage.

Moisture-Density Relations.—If a soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. The moisture-density relationship is important in earthwork, for, as a rule, optimum stability is obtained for any given compactive effort if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Plastic Limit.—The moisture content at which the soil material passes from a semisolid to a plastic state.

Plasticity Index.—The numerical difference between the liquid limit and the plastic limit. The plasticity index

[5] By John Fleckenstein, senior agronomist, Edward A. Fernau, assistant soils engineer, and Lyndon H. Moore, associate soils engineer, State of New York, Department of Transportation, Bureau of Soil Mechanics; and Walter S. Atkinson, State conservation engineer, Soil Conservation Service.

indicates the range of moisture content within which a soil material is plastic.

SHRINKAGE LIMIT.—The moisture content of soil material at which no further shrinkage occurs.

SHRINK-SWELL POTENTIAL.—An indication of the volume change to be expected of the soil material with changes in moisture content.

STRENGTH.—Used as a synonym for bearing capacity.

Engineering classification systems

The U.S. Department of Agriculture (USDA) system of classifying soil texture is used by agricultural scientists. The USDA texture terms used to describe soil material are defined in the Glossary. In some ways this system of classifying soils is comparable to the two systems generally used by engineers.

AASHO Classification System.—This system of classifying soils is one approved by the American Association of State Highway Officials (*2*). It is based on the field performance of highways in relation to the gradation of particle sizes, liquid limit, and plasticity index of soil materials. The soils having about the same general load-carrying capacity are grouped together in seven basic groups, though the range in load-carrying capacity within each group is wide, and there is an overlapping of load-carrying capacity from one group to another. The groups range from A-1 (gravelly soils of high bearing capacity, the best soils for subgrade) to A-7 (clayey soils having low bearing capacity when wet, the poorest soils for subgrade). Within each group, the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The group index number is given only for soils tested (as in table 5).

A detailed discussion of the AASHO system can be found in the Highway Research Board *Proceedings of the Twenty-Fifth Annual Meeting*, 1945, pages 375 to 392.

Unified Classification System.—This system was established by the Waterways Experiment Station, Corps of Engineers (*16*). It is based on identification of soils according to their texture and plasticity and their performance as engineering construction materials. In this system, two letters are used to designate each of 15 possible classes. The letters G, S, C, M, and O stand for gravel, sand, clay, silt, and organic soils, respectively, and W, P, L, and H refer to well graded, poorly graded, low liquid limit, and high liquid limit, respectively. In this system, SM and GM are sands and gravels that include fines of silt; ML and CL are silts and clays that have a liquid limit below 50; and MH and CH are silts and clays that have a liquid limit above 50.

Soil data and interpretations

To help evaluate the soils of Genesee County for engineering purposes, 17 soil samples were tested according to standard procedures. The results of these tests are given in table 5. Samples were taken from six soil series that are extensive in the county, and each of the six series was sampled in two or three different places. The soils from which the samples were taken formed in highly variable glacial till or in wind- or water-deposited materials. The range in grain size (texture) of this material is considerable; therefore, the engineering soil classification given in table 5 may not apply to all parts of the mapped soil unit. The classification does apply to the soil as it occurs throughout most of its acreage in the county. Also, in establishing the engineering soil classification, the particles larger than 3 inches were not considered.

Table 6 lists estimated properties of the soils that are significant to engineers. The test data shown in table 5, the information given in the section "Descriptions of the Soils" and elsewhere in the survey, and the knowledge gained through experience in using the soils for engineering construction were used in preparing this table. Because samples were taken from only six soil series, it was necessary to estimate the AASHO and Unified classifications for the rest of the soils mapped and to estimate the permeability and available moisture capacity, as shown in table 6.

Table 7 lists some appraisals of the suitability of soils for use in highways, embankments, and building foundations, and as a source of topsoil, sand, and gravel. Also listed in the table are characteristics that affect the suitability of the soils for installation of conservation engineering practices.

The intent of the engineering interpretations in table 7 is to provide a set of guides and indicators of potential hazards or characteristics that require unusual or special precautions in planning, designing, or constructing engineering structures.

Engineering properties of geologic deposits and bedrock

The following geologic deposits occur in Genesee County: glacial till, glacial outwash, lacustrine sediments, eolian deposits, alluvium, and muck. In addition, part of the county was mapped as Made land, tillable; Made land and Dumps; Rockland, limestone; and Fresh water marsh.

Each geologic unit has engineering significance that differs from that of other geologic units. Each unit is described in the following paragraphs, and the broad engineering significance is given. Where reference is made to the utility of any deposit, except for use as topsoil, it is assumed that the reference is to the material that underlies the solum. In general, the A and B horizons would be removed at the site of light fills, and topsoil would be stripped before the material in an area was used as embankment borrow. Where the utility for topsoil is indicated, it is assumed generally that only the surface soil is considered.

DEEP GLACIAL TILL

Deep glacial till occurs in every township in the county. The deposits are generally more than 4 feet thick over bedrock. In some places they occur over other unconsolidated deposits, such as glacial outwash or lacustrine sediments. In some places the till has been formed by the reworking of glacial lake deposits. Till formed dominantly from shale occurs in both the southern and the northern parts of the county. Till formed largely from limestone lies south of the escarpment. These deposits are bouldery and stony. Crystalline erratics occur randomly in all deposits.

Soils formed from deep glacial till are in the Cazenovia, Darien, Fremont, Honeoye, Hornell, Lansing, Marilla, Mohawk, Nunda, Ontario, and Remsen series.

TABLE 5.—*Engineering*

[Tests performed by the New York State Department of Transportation, Bureau of Soil Mechanics, in cooperation with U.S. Department (AASHO)

Soil name and location	Parent material	SCS report No. S63NY-19	Depth	Horizon	In-place moisture content	In-place dry density	Moisture-density [1]		Percolation rate [2]	Specific gravity [3]	Reaction
							Optimum moisture	Maximum dry density			
			Inches		*Percent*	*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Min. per in.*		*pH*
Elnora loamy fine sand:											
Town of Alabama, one-half mile southwest of community center of Tonawanda Indian Reservation, 40 feet west of N.Y.C. RR. track. (Modal profile.)	Eolian or lacustrine fine sand.	3-1	0-9	Ap	12.9	85.8	16.1	99.1	---------	2.63	6.5
		3-2	9-18	V2	10.9	103.8	14.0	107.7	1.00	2.70	7.3
		3-3	18-35	V3	10.3	99.5	14.4	104.3	1.29	2.70	7.3
		3-4	35-50	C1	15.1	99.4	15.5	102.0	1.15	2.68	7.4
		3-5	50-65	C2	16.5	([8])	16.5	102.0	---------	2.70	7.3
		3-6	65-70	IIC3	23.0	109.3	14.5	105.0	>120.0	2.71	8.2
One-half mile southwest of community center of Tonawanda Indian Reservation, 100 yards northwest of N.Y.C. RR. tracks. (Substratum finer textured than modal.)	Lacustrine fine sand underlain by calcareous, varved silt.	4-1	0-5	A1	23.0	([8])	20.0	97.9	---------	2.56	5.9
		4-2	5-17	B2	20.3	86.6	18.7	101.8	.72	2.63	5.4
		4-3	17-23	B3	19.3	85.9	5.2	102.7	---------	2.65	6.6
		4-4	23-31	C1	16.5	112.8	14.4	110.5	4.30	2.68	6.4
		4-5	31-55	IIC2	22.7	102.9	15.5	103.5	---------	2.69	6.5
		4-6	55-64	IIIC3	32.8	([8])	14.8	114.7	---------	2.73	7.6
Town of Pembroke, 200 feet west-northwest of intersection of Lake and Cohocton Roads. (Coarser textured than modal.)	Lacustrine sand, dominantly fine and medium sand.	5-1	0-11	Ap	23.0	73.3	19.3	90.7	---------	2.56	6.3
		5-2	11-24	B2	9.9	88.5	16.3	98.6	.50	2.67	6.1
		5-3	24-32	B3	10.3	88.6	16.3	98.6	---------	2.69	5.9
		5-4	32-48	C1	20.0	92.8	14.2	95.8	.95	2.72	5.7
		5-5	48-62	IIC2	22.6	([8])	14.5	109.5	1.83	2.72	5.6
Marilla shaly silt loam:											
Town of Darien, 1,500 feet north of the Wyoming County line on Harlow Road, 50 feet in field on west side of road. (Modal profile.)	Shaly loam to shaly silt loam glacial till.	6-1	0-7	Ap	32.1	([8])	21.0	98.0	---------	2.56	4.6
		6-3	11-22	B22	15.7	113.8	10.0	122.0	>120.0	2.63	4.9
		6-4	22-44	C1x	13.7	121.0	14.0	119.7	---------	2.70	4.7
		6-5	44-62	C2x	13.7	120.1	10.4	125.8	---------	2.66	5.3
Town of Darien, 100 feet south of intersection of Tinkham and Chick Roads; 40 feet in field on east side of road. (Coarse-textured substratum.)	Very shaly silt loam and loam glacial till.	7-1	0-10	Ap	25.9	81.5	18.5	102.2	[11]>120.0	2.59	4.8
		7-2	10-15	B21	24.7	([8])	19.2	103.3	[11]>120.0	2.64	5.0
		7-3	15-23	B22	12.6	115.9	15.0	113.6	---------	2.68	4.5
		7-4	23-34	C1x	11.4	126.1	11.2	122.2	11.20	2.68	4.8
		7-5	34-50	C2x	10.0	126.8	8.7	125.0	---------	2.68	6.0
Town of Darien, 350 feet east of intersection of Tinkham and Chick Roads, 40 feet south of road. (Less shaly than modal profile.)	Silty mantle over shaly loam till.	8-1	0-10	Ap	[11]41.7	74.9	27.4	91.5	30.00	2.66	4.5
		8-2	10-15	B21	[11]41.7	([8])	------	------	---------	------	------
		8-3	15-21	B22	38.4	82.5	26.3	93.6	---------	2.71	4.7
		8-4	21-26	A'2	24.1	103.0	19.3	103.3	---------	2.70	4.5
		8-5	26-37	IIB'x	12.6	125.5	13.9	118.5	---------	2.71	4.8
		8-6	37-48	IIC1x	9.4	127.5	11.2	123.0	---------	2.70	5.9

See footnotes at end of table.

test data

of Commerce, Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway Officials (*2*)]

Mechanical analysis [4]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
1-in.[5]	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [6]
------	------	100. 0	99. 9	99. 7	98. 3	25. 5	13. 6	7. 3	5. 9	4. 9	------	[7] NP	A-2-4	SM
100. 0	99. 9	99. 8	99. 8	99. 7	99. 5	28. 8	11. 7	6. 8	4. 5	3. 6	------	NP	A-2-4	SM
------	------	------	------	100. 0	99. 9	44. 6	12. 7	5. 0	3. 6	3. 2	------	NP	A-4	SM
------	------	------	100. 0	99. 9	99. 8	30. 9	10. 0	4. 6	2. 7	2. 7	------	NP	A-2-4	SM
------	------	------	------	------	100. 0	17. 8	6. 4	5. 0	3. 2	2. 0	------	NP	A-2-4	SM
------	------	------	------	------	------	93. 0	47. 1	17. 7	7. 2	5. 5	------	NP	A-4	ML
------	------	100. 0	99. 9	99. 9	96. 8	28. 6	------	------	------	------	------	NP	A-2-4	SM
------	------	100. 0	99. 9	99. 7	96. 8	16. 1	15. 2	10. 7	6. 3	4. 7	------	NP	A-2-4	SM
------	------	100. 0	99. 8	99. 7	97. 5	17. 1	9. 8	6. 7	4. 5	3. 9	------	NP	A-2-4	SM
------	------	------	------	100. 0	98. 1	10. 2	9. 8	4. 9	4. 0	3. 7	------	NP	A-2-4	SP-SM
------	------	100. 0	99. 7	99. 7	99. 6	30. 1	10. 0	5. 5	5. 0	5. 0	------	NP	A-2-4	SM
------	------	------	------	100. 0	99. 8	93. 7	63. 7	39. 4	19. 3	14. 5	21. 9	7. 6	A-4	CL
------	------	------	100. 0	99. 7	98. 4	27. 1	(9)	------	------	------	------	NP	A-2-4	SM
------	------	------	100. 0	99. 8	99. 3	8. 9	(10)	------	------	------	------	NP	A-3	SP-SM
------	------	------	------	100. 0	99. 5	6. 5	(10)	------	------	------	------	NP	A-3	SP-SM
------	------	------	------	100. 0	99. 1	5. 0	(10)	------	------	------	------	NP	A-3	SP-SM
------	------	100. 0	99. 9	99. 7	91. 6	3. 0	(10)	------	------	------	------	NP	A-3	SP
------	100. 0	96. 4	87. 0	75. 7	65. 2	54. 2	(9)	------	------	------	43. 0	7. 9	A-5	ML
96. 8	93. 2	81. 5	72. 7	65. 7	53. 8	36. 1	28. 8	20. 6	10. 9	7. 5	20. 2	4. 3	A-4	SM-SC
95. 9	93. 6	85. 3	77. 3	66. 8	56. 0	43. 1	37. 1	27. 4	14. 7	11. 0	23. 8	6. 7	A-4	SM-SC
97. 0	92. 5	82. 8	73. 5	62. 6	48. 2	33. 9	27. 5	20. 0	10. 2	6. 7	19. 1	5. 0	A-2-4	SM-SC
100. 0	99. 7	95. 5	85. 5	73. 4	65. 0	58. 6	(9)	------	------	------	39. 1	12. 7	A-6	ML
100. 0	97. 5	89. 6	76. 4	68. 1	61. 6	57. 6	49. 3	39. 4	23. 2	13. 1	45. 1	19. 3	A-7-6	CL
95. 7	92. 8	80. 2	69. 6	65. 9	62. 0	58. 4	42. 4	33. 9	20. 9	13. 9	30. 8	11. 4	A-7-6	CL
91. 1	85. 8	69. 6	59. 0	50. 5	38. 7	28. 9	23. 8	18. 7	11. 0	7. 2	22. 5	7. 0	A-2 4	GM-GC
90. 4	84. 2	67. 2	55. 0	43. 5	28. 8	18. 9	15. 8	12. 8	8. 5	6. 2	24. 0	8. 5	A-2-4	GC
98. 4	98. 0	97. 6	96. 2	94. 0	90. 9	84. 5	(9)	------	------	------	41. 3	14. 7	A-7-6, A-7-5	ML or OL
97. 6	97. 2	96. 1	94. 6	93. 3	90. 6	85. 0	73. 8	64. 4	38. 1	25. 7	39. 7	13. 9	A-6	ML or OL
98. 0	95. 7	90. 4	85. 9	83. 5	79. 2	72. 9	64. 7	55. 8	31. 7	21. 5	35. 9	14. 1	A-6	CL
96. 4	93. 3	80. 9	63. 8	50. 1	40. 7	34. 0	29. 3	23. 6	14. 1	10. 0	25. 3	9. 3	A-2-4	GC
94. 3	90. 0	77. 0	62. 7	50. 0	38. 2	28. 9	25. 1	20. 2	11. 8	7. 7	23. 1	6. 7	A-2-4	GM-GC

292-581—68——4

TABLE 5.—*Engineering*

Soil name and location	Parent material	SCS report No. S63NY–19	Depth	Horizon	In-place moisture content	In-place dry density	Moisture-density [1]: Optimum moisture	Moisture-density [1]: Maximum dry density	Percolation rate [2]	Specific gravity [3]	Reaction
			Inches		*Percent*	*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Min. per in.*		*pH*
Minoa very fine sandy loam:											
Town of Pembroke, 1½ miles northeast of village of Pembroke on Gabby Road. Pit is 75 yards north of road. (Modal profile.)	Lacustrine very fine sand and silt.	2–1	0–10	Ap	21. 1	89. 8	15. 8	106. 3	1. 56	2. 62	5. 8
		2–3	12–20	B21	20. 2	83. 4	21. 4	101. 6	3. 25	2. 71	5. 3
		2–4	20–32	B22	18. 7	100. 6	12. 7	112. 3	5. 86	2. 68	5. 8
		2–5	32–61	C1	21. 6	98. 6	15. 6	101. 2	---------	2. 70	5. 9
		2–6	61–71	IIC2	22. 7	([8])	19. 9	104. 0	---------	2. 72	6. 2
Town of Batavia, 1.1 miles west of Bushville on State Route 5, 25 feet north of highway. (Coarser textured than modal profile.)	Stream-terrace deposits of very fine, fine, medium, and coarse sands.	1–1	0–8	Ap	21. 0	81. 8	22. 8	100. 1	4. 66	2. 62	6. 6
		1–3	12–21	IIB22	16. 2	104. 3	13. 0	118. 0	13. 76	2. 69	6. 7
		1–4	21–32	IIC1x	20. 7	([8])	12. 5	114. 5	---------	2. 69	6. 7
		1–6	34–40	IVC3	29. 7	([8])	11. 7	119. 6	---------	2. 71	7. 4
Town of Pembroke, 1,000 feet south-southeast of State Route 5 and east end of New York State Thruway overpass. (Finer textured than modal profile.)	Lacustrine very fine sand.	9–1	0–11	Ap	33. 9	71. 7	19. 6	95. 6	1. 90	2. 57	6. 4
		9–2	11–21	B2	23. 1	96. 1	16. 0	99. 4	2. 85	2. 67	6. 1
		9–4	25–34	C1	21. 9	104. 3	15. 0	105. 5	8. 65	2. 69	6. 6
		9–5	34–38	IIC2	23. 3	([8])	13. 6	113. 0	---------	2. 70	8. 2
		9–6	38–50	IIIC3	24. 2	105. 0	15. 3	102. 7	---------	2. 70	8. 5
Mohawk silt loam:											
Town of Batavia, 1,300 feet south-southeast of Wortendyke Road and N.Y.C. RR. crossing. (Modal profile.)	Glacial till, dominantly calcareous, dark-colored shale but also limestone.	10–1	0–8	Ap	29. 9	76. 4	29. 9	88. 1	[11] 2. 30	2. 51	6. 2
		10–2	8–17	B2	30. 1	85. 3	20. 5	102. 2	[11] 2. 30	2. 59	7. 6
		10–3	17–70	C	11. 2	105. 5	15. 6	112. 0	6. 83	2. 68	8. 1
Town of Batavia, 1,300 feet southeast of intersection of Wortendyke Road and N.Y.C. RR. tracks. (Coarse-textured substratum.)	Calcareous glacial till, dominantly dark-colored shale in the upper 2 feet, fine gravelly very fine sandy loam below.	11–1	0–7	Ap	23. 3	86. 9	20. 0	99. 5	1. 60	2. 56	6. 4
		11–2	7–14	A2	28. 4	87. 3	19. 5	100. 4	---------	2. 55	5. 7
		11–3	14–24	IIB2	34. 1	81. 6	17. 8	101. 7	1. 60	2. 65	6. 5
		11–4	24–58	IIIC1	13. 6	107. 0	14. 4	114. 4	90. 00	2. 70	8. 2
Town of Stafford, 600 feet southeast of intersection of State Route 63 and Bethany Center Road, 20 feet southwest of State Route 63. (Contains more limestone in substratum and has a higher silt content than modal profile.)	Calcareous glacial till, dominantly dark-colored shale but also limestone.	15–1	0–10	Ap	22. 0	92. 3	21. 6	101. 2	[11] 5. 30	2. 61	6. 8
		15–2	10–23	B2	18. 7	104. 2	18. 7	106. 5	[11] 5. 30	2. 68	7. 2
		15–3	23–39	C1	11. 2	128. 0	10. 8	125. 0	40. 0	2. 69	8. 0
		15–4	39–52	C2	11. 1	130. 1	9. 4	130. 0	---------	2. 70	7. 4

See footnotes at end of table.

test data—Continued

Mechanical analysis [4]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
1-in.[5]	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [6]
99.4	98.8	98.0	97.0	94.7	90.3	49.1	(9)	------	------	------	------	NP	A-4	SM
97.7	97.6	96.4	94.1	91.6	87.0	45.8	25.2	11.8	5.5	4.2	------	NP	A-4	SM
97.3	97.1	96.2	95.3	94.5	91.0	55.3	25.7	10.7	7.9	6.3	------	NP	A-4	ML
------	100.0	99.9	99.6	99.3	98.0	64.2	32.9	11.6	8.0	6.7	------	NP	A-4	ML
------	------	100.0	99.5	98.9	97.4	89.7	72.2	41.8	23.8	17.1	21.7	8.2	A-4	CL
99.9	99.8	99.2	98.3	96.8	81.1	32.7	29.6	21.0	10.5	5.0	24.5	6.4	A-2-4	SM-SC
------	100.0	99.4	98.4	96.6	80.0	18.4	17.4	13.4	9.8	6.5		NP	A-2-4	SM
------	------	100.0	99.8	98.8	90.2	12.4	10.6	8.7	6.1	5.5	------	NP	A-2-4	SM
------	------	------	100.0	99.8	94.3	14.7	13.6	12.4	10.7	9.5	------	NP	A-2-4	SM
100.0	98.2	97.2	95.9	94.8	93.2	67.5	(9)	------	------	------	------	NP	A-4	ML
------	------	------	------	100.0	98.3	48.7	23.4	8.6	6.8	6.3	------	NP	A-4	SM
------	------	------	100.0	99.9	99.8	27.9	14.6	10.9	7.7	6.7	------	NP	A-2-4	SM
------	------	------	------	------	100.0	94.7	66.3	29.5	12.3	9.6	------	NP	A-4	ML
------	------	------	------	------	------	92.8	42.7	8.6	5.9	5.3	------	NP	A-4	ML
99.6	99.1	98.2	97.1	91.7	82.9	70.0	(9)	------	------	------	47.0	19.0	A-7-6	ML
93.3	90.0	81.2	76.9	72.0	65.7	57.8	45.5	38.8	26.9	20.2	39.1	15.7	A-6	CL
84.0	79.4	69.9	60.3	50.1	36.9	24.8	21.3	16.3	9.7	7.0	19.6	6.6	A-2-4	GM-GC
98.4	97.7	95.8	93.3	86.8	77.4	64.6	(9)	------	------	------	40.1	15.1	A-6	CL
98.3	97.1	92.4	87.1	79.0	67.7	57.6	48.3	40.7	25.4	17.5	37.5	15.6	A-6	CL
83.7	79.1	70.8	65.0	59.4	51.3	45.4	35.8	30.1	20.5	15.4	40.7	16.5	A-6	GC
92.7	90.0	85.6	79.7	75.7	68.9	52.2	36.3	22.5	10.6	6.5	16.0	5.3	A-4	ML-CL
99.2	98.6	97.0	94.0	90.3	85.0	69.2	57.0	42.1	25.2	16.5	35.1	14.4	A-6	CL
99.8	98.9	96.4	94.4	91.4	84.9	66.0	53.8	41.8	27.8	21.4	28.9	11.7	A-6	CL
95.6	93.2	85.4	76.1	68.3	57.5	37.8	30.0	20.6	11.8	9.0	17.0	6.0	A-4	SM-SC
96.7	93.4	86.5	79.6	71.2	58.6	41.8	31.8	21.7	15.4	12.3	26.7	9.5	A-4	SC

TABLE 5.—*Engineering*

Soil name and location	Parent material	SCS report No. S63NY-19	Depth	Horizon	In-place moisture content	In-place dry density	Moisture-density [1] Optimum moisture	Moisture-density [1] Maximum dry density	Percolation rate [2]	Specific gravity [3]	Reaction
			Inches		*Percent*	*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Min. per in.*		*pH*
Remsen silt loam:											
Town of Bethany, Bethany Center Road, 1,400 feet south of Erie Lackawanna R.R., 50 feet west of road. (Modal profile.)	Calcareous glacial till, dominantly gray shale.	14-1	0-4	Ap	[11] 37. 9	[11] 65. 0	[11] 30. 0	[11] 86. 7	60. 0	2. 62	5. 0
		14-2	4-7	B21	[11] 37. 9	[11] 65. 0	[11] 30. 0	[11] 86. 7	60. 0	2. 67	5. 0
		14-3	7-25	B22	32. 3	86. 9	26. 0	92. 4	---------	2. 72	5. 1
		14-4	25-31	C1	19. 2	109. 3	22. 0	102. 0	---------	2. 77	7. 8
		14-5	31-47	IIC2	18. 0	118. 0	19. 4	105. 0	---------	2. 76	7. 8
Town of Darien, 50 feet south of intersection of Sumner and Walker Roads, pit in road cut on east side of Walker Road. (Finer textured than modal profile.)	Calcareous glacial till, dominantly olive-colored clay shale.	13-1	0-5	A1	[11] 33. 3	[11] 72. 7	33. 5	79. 8	---------	2. 56	6. 6
		13-2	5-10	A2	[11] 33. 3	[11] 72. 7	25. 3	95. 2	---------	2. 67	5. 0
		13-3	10-22	B2	22. 4	102. 9	20. 9	103. 8	>120. 0	2. 78	5. 4
		13-4	22-38	C1	22. 8	107. 2	21. 5	101. 4	>120. 0	2. 77	7. 8
		13-5	38-45	C2	16. 5	118. 2	11. 5	114. 9	>120. 0	2. 75	7. 8
Town of Darien, 2,300 feet south of Walker Road on Smithly Road, 30 feet east of Smithly Road. (Coarser textured than modal profile.)	Calcareous glacial till, shaly silty clay loam in the upper part, gravelly loam in the lower part.	12-1	0-5	A1	[11] 31. 8	[11] 80. 0	29. 3	85. 7	[11] 10. 97	2. 56	5. 8
		12-2	5-8	A2	[11] 31. 8	[11] 80. 0	22. 3	97. 2	[11] 10. 97	2. 63	5. 2
		12-3	8-21	B2	25. 0	97. 9	19. 3	103. 4	---------	2. 72	5. 0
		12-4	21-34	C1	18. 7	106. 0	19. 3	105. 3	>120. 00	2. 71	6. 5
		12-5	34-50	IIC2	15. 1	118. 6	12. 9	120. 1	---------	2. 72	8. 0
Schoharie silt loam:											
Town of Stafford, 700 feet west of intersection of Prole and Horseshoe Lake Roads, south side of Horseshoe Lake Road, 15 feet in field. (Modal profile.)	Lacustrine sediments of reddish silty clay over laminated very fine sand, silt, and clay.	17-1	0-8	Ap	25. 4	76. 5	28. 2	90. 8	[11] 5. 17	2. 69	6. 8
		17-2	8-20	B2	23. 9	101. 3	24. 0	97. 2	[11] 5. 17	2. 75	7. 2
		17-3	20-32	C1	21. 4	108. 7	18. 5	108. 0	---------	2. 75	7. 8
		17-4	32-44	IIC2	18. 8	114. 7	17. 6	110. 6	---------	2. 74	8. 1
		17-5	44-57	IIIC3	22. 4	([8])	15. 5	113. 0	---------	2. 75	8. 0
Schoharie silty clay loam:											
Town of Stafford, 1,000 feet east of intersection of Prole and Horseshoe Lake Roads, north side of Horseshoe Lake Road, 15 feet in field. (Coarser textured than modal profile.)	Lacustrine sediments of reddish silty clay, with layers of silt and very fine sand.	16-1	0-8	Ap	18. 4	79. 6	22. 4	101. 0	. 36	2. 66	5. 7
		16-2	8-11	A2	17. 9	([8])	15. 3	111. 5	---------	2. 70	6. 1
		16-3	11-30	B2	18. 1	107. 0	15. 4	112. 7	. 36	2. 72	5. 6
		16-4	30-32	IIB31	21. 1	([8])	15. 5	114. 6	---------	2. 72	6. 2
		16-5	32-49	IIIB32	24. 2	100. 4	22. 8	100. 0	---------	2. 72	6. 6
		16-6	49-61	IVC1	20. 0	100. 8	21. 3	103. 1	---------	2. 72	7. 1
		16-7	61-65	VC2	16. 3	102. 6	18. 7	108. 2	---------	2. 74	8. 0

[1] Based on AASHO Designation T 99-57, Method C (*2*).

[2] Based on "Standard Percolation Test," N.Y. State Dept. of Health Bul. No. 1.

[3] Specific gravity test performed on fraction passing ¾-inch sieve.

[4] Mechanical analyses according to the AASHO Designation T 88-57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for naming textural classes for soils.

[5] From 91.1 to 100 percent passed the 1½-inch sieve, 95.1 to 100 percent passed the 2-inch sieve, and 97.6 to 100 percent passed the 3-inch sieve.

test data—Continued

Mechanical analysis [4]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—						AASHO	Unified [6]
1-in.[5]	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
------	------	------	------	100.0	99.8	98.8	(9)	------	------	------	61.0	25.2	A-7-5	MH-OH
------	------	------	------	------	------	100.0	93.2	84.0	64.9	39.7	56.0	25.0	A-7-5	MH-OH
------	------	------	------	------	------	100.0	93.1	90.4	74.1	53.0	53.1	24.6	A-7-6	CH
------	------	------	------	------	------	100.0	91.2	88.0	65.7	45.1	45.6	21.3	A-7-6	CL
------	------	------	------	------	------	100.0	83.3	75.7	43.0	29.1	37.8	15.9	A-6	CL
------	------	------	------	100.0	98.6	92.1	(9)	------	------	------	49.0	17.6	A-7-5	ML or OL
------	------	------	100.0	99.4	98.5	92.7	84.6	78.3	52.2	33.2	43.5	17.7	A-7-6	CL
------	------	------	------	------	------	100.0	89.2	86.1	63.3	46.2	42.2	19.8	A-7-6	CL
------	------	------	100.0	99.7	98.7	97.8	88.6	84.7	58.2	39.3	39.0	18.6	A-6	CL
87.6	84.0	78.8	75.6	75.4	74.8	74.2	68.8	64.4	44.5	28.2	38.6	17.0	A-6	CL
------	------	------	100.0	99.4	96.3	83.7	(9)		------	------	50.5	20.2	A-7-5	MH-OH
97.9	96.9	94.8	93.2	90.1	85.9	74.4	61.8	51.1	28.1	16.0	37.9	13.7	A-6	CL
95.8	95.4	93.9	87.7	83.1	78.4	67.4	52.8	43.3	30.8	21.6	33.7	12.3	A-6	CL
96.7	96.2	94.4	91.2	86.8	82.1	71.9	61.0	51.0	35.7	24.2	37.7	16.2	A-6	CL
------	------	100.0	92.8	84.3	70.5	56.5	46.6	38.6	24.1	16.9	24.9	9.9	A-4	CL
------	------	100.0	99.8	99.4	97.2	91.3	81.4	69.9	45.6	30.3	36.0	14.0	A-6	CL
------	------	------	------	------	------	100.0	84.4	75.0	55.7	43.1	47.0	26.1	A-7-6	CL
------	------	------	------	------	------	100.0	90.7	84.9	54.8	37.8	36.4	17.7	A-6	CL
------	------	------	------	------	------	100.0	91.8	80.6	47.7	31.2	32.2	12.4	A-6	CL
------	------	------	------	------	------	100.0	83.5	62.4	34.1	23.9	26.1	9.0	A-4	CL
------	------	------	------	100.0	98.4	91.4	83.8	69.0	37.9	21.3	30.0	12.3	A-6	CL
------	------	------	------	100.0	98.3	90.0	78.5	65.2	36.2	24.4	26.1	9.8	A-4	CL
------	------	------	100.0	99.4	97.6	87.8	73.2	56.9	40.1	29.8	30.0	14.5	A-6	CL
------	------	------	------	------	------	100.0	77.3	48.8	31.2	23.5	27.0	10.7	A-6	CL
------	------	------	------	------	------	100.0	78.8	51.5	30.8	24.5	28.0	12.4	A-6	CL
------	------	------	100.0	99.4	98.8	81.6	47.8	35.3	28.2	21.8	25.2	11.0	A-6	CL
99.7	99.5	98.1	95.5	92.0	85.9	78.0	62.6	41.7	20.5	15.3	22.7	8.4	A-4	CL

[6] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are SP-SM, SM-SC, and GM-GC.

[7] Nonplastic.

[8] Lack of data indicates that tests were not made, because the horizon was too thin, a water table was encountered, or other adverse conditions prevented making the tests.

[9] No hydrometer analysis was performed on soil horizons containing a considerable amount of organic material, because organic matter has a flocculating effect on organic portions of the sample and results are unreliable.

[10] No hydrometer analysis was performed on soil samples that contained little or no clay and in which less than 10 percent of the particles passed the No. 200 sieve.

[11] Composite field tests were taken on two or more horizons where tests on the individual horizons were prevented by thinness of the horizons. Field tests affected are in-place moisture content, in-place dry density, and percolation rate. Other laboratory data are for the separate horizons.

TABLE 6.—*Estimated properties*

[Dashes indicate information is not available

Soil and map symbol	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification
				USDA texture
	Feet	*Feet*	*Inches*	
Alden mucky silt loam (Ad).	4	0–1½	0–16	Mucky silt loam
			16–31	Loam
			31–40	Cherty loam till
Allis silty clay loam, deep (AeA).	2–5	0–1	0–40	Silty clay loam to silty clay
			40	Shale bedrock
Alluvial land (Al).	4–25	[1] 0–1	(2)	(2)
Angola silt loam (AnA, AnB).	1½–3	½–1½	0–21	Silt loam
			21–31	Shaly silty clay loam
			31	Shale bedrock
Appleton silt loam (ApB).	3½–20	½–1½	0–16	Silt loam or loam
			16–30	Loam
			30–42	Fine gravelly loam till
Arkport very fine sandy loam (ArB, ArC). Arkport and Dunkirk soils (AsD, AsE). (Estimated properties are for Arkport soils only. For properties of the Dunkirk soils, see the Dunkirk series.)	4–80	10+	0–20	Very fine sandy loam
			20–60	Stratified loamy fine sand, very fine sand, and coarse silt.
Benson soils (BeB, BeD, BeE).	1–1½	(4)	0–19	Cherty or very cherty loam
			19	Limestone bedrock
Burdett silt loam (BuA, BuB).	3½–10	½–1½	0–28	Loam or silt loam
			28–40	Silty clay loam
			40–52	Shaly silty clay loam till
Canandaigua silt loam (CaA). Canandaigua mucky silt loam (CdA).	8–30	0–1	0–9	Silt loam
			9–45	Silt loam
Cazenovia silt loam (CeA, CeB, CeC). Cazenovia silty clay loam (CgC3, CgD3).	3½-25	1½–2½	0–12	Silt loam
			12–31	Silty clay loam
			31–37	Clay loam till
Chenango shaly silt loam (ChA, ChB, ChC).	4–40	3+	0–21	Shaly silt loam
			21–33	Very shaly silt loam
			33–45	Stratified sand and shaly gravel
Collamer silt loam (ClB).	5–40	1½–2	0–40	Silt loam
Colonie loamy fine sand (CmB, CmC).	10–60	10+	0–50	Loamy fine sand
			50–75	Fine sand
Conesus silt loam (CoA, CoB, CoC).	3½–20	1½–2½	0–36	Silt loam
			36–45	Gritty silt loam till
Darien silt loam (DaA, DaB, DaC, DaD).	3½–20	½–1½	0–11	Silt loam
			11–32	Silty clay loam
			32–40	Shaly silty clay loam till
Dunkirk silt loam (DuB, DuC).	5–50	2	0–21	Silt loam
			21–32	Silt loam or silty clay loam
			32–50	Stratified silt and sand
Edwards muck (Ed).	3½–50	0	(2)	(2)
Eel silt loam (Ee).	4–40	[1] 1½–2½	0–40	Silt loam

See footnotes at end of table.

of the soils

for an estimate, or does not apply]

Classification—Continued		Percentage passing sieve—			Permeability	Reaction	Available moisture capacity
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
					Inches per hour	*pH*	*Inches per inch of soil*
ML, OL	A-6	95-100	90-100	85-95	0. 63-2. 0	6. 0-7. 4	0. 17-0. 21
ML, CL	A-4	65-85	60-85	50-65	0. 20-2. 0	7. 0-7. 5	0. 17-0. 19
ML, CL	A-4	60-70	55-75	50-60	<0. 2	7. 0-7. 5	-----
ML, CL	A-4	85-95	80-90	75-85	0. 2-0. 63	5. 0-5. 5	0. 15-0. 18
-----	-----	-----	-----	-----	-----	-----	-----
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
ML	A-4, A-6	75-100	75-95	55-90	0. 2-0. 63	6. 0-7. 0	0. 11-0. 15
CL, SC	A-6	80-100	75-90	40-70	<0. 2	6. 0-7. 5	0. 14-0. 16
-----	-----	-----	-----	-----	-----	-----	-----
ML, CL	A-4, A-6	90-100	85-95	65-75	0. 63-2. 0	6. 0-7. 0	0. 18-0. 22
CL	A-4, A-6	80-90	70-80	55-70	0. 2-2. 0	5. 5-6. 5	0. 15-0. 18
GM, GC, SC	A-2, A-4	60-80	45-70	30-50	<0. 2	(3)	-----
SM, ML	A-4	100	100	45-55	2. 0-6. 3	5. 5-6. 5	0. 12-0. 15
SM	A-4	100	100	40-50	2. 0-6. 3	6. 5-7. 5	0. 09-0. 12
ML	A-4	70-95	60-80	55-65	0. 63-6. 3	6. 0-7. 5	0. 11-0. 14
-----	-----	-----	-----	-----	-----	-----	-----
ML	A-4	100	100	85-95	0. 63-2. 0	6. 5-7. 2	0. 18-0. 24
ML, CL	A-4, A-6	100	100	85-95	0. 2-0. 63	7. 0-7. 5	0. 15-0. 20
CL	A-4, A-6	100	75-85	60-70	<0. 2	(5)	0. 10-0. 12
ML, CL, OL	A-6	100	95-100	80-90	0. 63-2. 0	7. 0-7. 5	0. 20-0. 24
ML, CL	A-4	100	95-100	75-90	0. 20-0. 63	7. 0-7. 5	0. 17-0. 22
ML, CL	A-4	90-100	85-95	60-75	0. 63-2. 0	6. 5-7. 5	0. 16-0. 19
CL	A-4, A-6	90-100	85-100	65-90	0. 2-0. 63	6. 8-7. 5	0. 16-0. 19
CL	A-4	75-95	70-90	55-70	<0. 2	(5)	-----
SM, SC	A-2	70-90	50-70	15-25	2. 0-6. 3	5. 0-5. 5	0. 13-0. 15
GW, GM	A-1, A-2	30-40	20-30	5-15	>6. 3	5. 0-5. 5	0. 09-0. 11
GW, GM	A-1	30-40	20-30	5-10	>6. 3	5. 0-5. 5	0. 06-0. 10
ML-CL, CL	A-4, A-6	90-100	85-100	75-95	0. 2-2. 0	6. 0-7. 0	0. 20-0. 24
SM	A-2	100	90-100	15-30	>6. 3	5. 0-6. 0	0. 05-0. 07
SP-SM, SM	A-2, A-3	100	100	5-15	>6. 3	6. 0-6. 5	0. 04-0. 06
ML, CL	A-4	85-95	85-95	50-65	0. 63-2. 0	6. 0-6. 5	0. 17-0. 19
SM, SC	A-4	75-85	70-80	40-50	<0. 2	6. 5-7. 0	0. 17-0. 21
ML	A-6, A-7	90-100	90-95	75-85	0. 63-2. 0	6. 0-7. 0	0. 12-0. 16
CL	A-6	85-95	80-90	65-75	0. 2-0. 63	6. 0-7. 5	0. 12-0. 16
CL	A-4	90-100	80-90	50-70	<0. 2	(5)	-----
ML, CL	A-4	100	95-100	60-80	0. 63-2. 0	5. 5-6. 5	0. 13-0. 28
ML, CL	A-4, A-6	100	95-100	70-85	0. 2-0. 63	6. 0-7. 5	0. 14-0. 17
ML	A-4, A-6	100	95-100	50-85	0. 20-0. 63	(5)	-----
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
ML, CL	A-4	100	100	80-90	0. 63-2. 0	6. 5-7. 0	0. 16-0. 20

TABLE 6.—*Estimated properties*

Soil and map symbol	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification
				USDA texture
	Feet	*Feet*	*Inches*	
Elnora loamy fine sand (ElB).	4–40	1½–2½	0–18	Loamy fine sand and loamy very fine sand.
			18–75	Fine sand and very fine sand
Fonda mucky silt loam (Fo).	4–20	0–½	0–5	Mucky silt loam
			5–13	Silt loam
			13–30	Silty clay
			30–40	Shaly till or stratified silt, sand, and clay.
Fredon gravelly loam. (Mapped only in an undifferentiated group with Phelps soils.)	10–40	½–1½	0–36	Gravelly loam or sandy loam
			36–48	Stratified silt, sand, and gravel
Fremont silt loam (FrA, FrB, FrC).	3½–10	½–1¼	0–12	Silt loam
			12–50	Silt loam to light silty clay loam
Fresh water marsh (Fw).	(2)	(2)	(2)	(2)
Galen and Minoa very fine sandy loams (GmA). Galen very fine sandy loam (GnB). (Estimated properties are for the Galen soils only. For properties of the Minoa soils, see the Minoa series.)	4–20	1–2	0–20	Very fine sandy loam
			20–40	Loamy very fine sand
			40–50	Stratified fine sand, loamy fine sand, and silt.
Genesee silt loam (Gs).	20–60	[1] 3+	0–42	Silt loam
Halsey silt loam (HaA).	10–40	0–½	0–16	Silt loam or gravelly sandy loam
			16–45	Gravelly sand or stratified sand and gravel.
Hilton loam (HlA, HlB).	4–25	1½–2½	0–36	Loam or light clay loam
			36–52	Gravelly loam till
Holly silt loam (Hm).	4–10	[1] 0–1	0–40	Silt loam
Honeoye silt loam, moderately deep variant (HnB).	1½–3½	3+	0–23	Silt loam
			23–30	Flaggy silt loam
			30	Limestone bedrock
Hornell silty clay loam (HoB3, HoC3). Hornell and Fremont soils (HsD3). (Estimated properties are for the Hornell soils only. For properties of the Fremont soils, see the Fremont series.)	1½–3½	1–2	0–20	Silty clay loam
			20–30	Firm silty clay
			30	Fractured shale bedrock
Ilion silt loam (IoA, IoB).	3½–20	0–1	0–14	Silt loam
			14–28	Silty clay loam
			28–40	Shaly silty clay loam till
Kendaia silt loam. (Mapped only in an undifferentiated unit with Lyons silt loam.)	3½–40	½–1½	0–22	Silt loam
			22–42	Loam till
Kendaia silt loam, moderately deep variant (KeA).	1½–3½	½–1½	0–22	Silt loam
			22–30	Loam till
Lakemont silty clay loam (La).	6–30	0–1	0–14	Silty clay loam
			14–40	Silty clay, clay, and silty clay loam

See footnotes at end of table.

of the soils—Continued

Classification—Continued		Percentage passing sieve—			Permeability	Reaction	Available moisture capacity
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
					Inches per hour	*pH*	*Inches per inch of soil*
SM	A–2, A–4	100	95–100	25–45	>6.3	6.0–7.0	0.05–0.08
SP, SM	A–2	100	95–100	5–30	2.0–6.3	6.0–7.0	0.02–0.04
ML–OH	A–7	100	80–90	75–90	0.2–0.63	6.5–7.5	0.16–0.20
ML	A–7	100	80–100	70–80	<0.2	[6]	0.20–0.25
CL	A–7	100	90–100	95–100	<0.2		
[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
ML	A–4	65–80	60–75	55 65	0.63–2.0	6.0–7.3	0.15–0.19
GM, GC	A–2	40–60	25–30	15–25	0.63–6.3+	7.4+	
ML, CL	A–6, A–7	90–100	90–100	75–95	0.63–2.0	5.0–5.5	0.16–0.20
ML, CL	A–4	90–100	70–95	50–90	<0.2	5.0–5.5	0.16–0.20
[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
SM or ML	A–4	100	95–100	35–65	2.0–6.3	5.5–6.5	0.10–0.12
SM	A–4	100	100	40–50	0.63–2.0	5.5–7.5	0.10–0.12
SM, ML	A–4	100	100	40–70	0.63–2.0	[5]	
ML	A–4	100	100	80–90	0.63–2.0	6.8–7.2	0.15–0.18
ML	A–4	65–80	60–75	55–65	0.63–2.0	6.5–7.0	0.12–0.15
GM or SM	A–1 or A–2	40–70	25–60	15–25	>6.3	7.0–7.5	0.10–0.12
ML	A–4	75–95	70–90	55–70	0.63–2.0	5.5–6.8	0.14–0.18
ML, CL	A–4	80–85	75–80	55–65	0.2–0.63	7.0–7.5	
ML	A–4	100	95–100	80–90	0.63–2.0	5.0–5.4	0.15–0.19
ML, CL	A–4	80–95	75–90	55–65	0.63–2.0	6.8–7.2	0.15–0.19
GM, SM	A–4	60–80	50–75	35–45	0.63–2.0	7.0–7.5	0.15–0.19
						[5]	
ML, CL	A–6, A–7	95–100	90–100	80–90	0.63–2.0	5.0–5.5	0.07–0.09
ML, CL, CH	A–6, A–7	95–100	90–100	80–90	<0.2	5.0–5.5	0.07–0.09
ML, CL	A–4 or A–6	90–100	90–95	75–85	0.2–2.0	6.0–6.5	0.15–2.0
CL	A–6	90–95	85–90	65–75	0.2–0.63	6.5–7.5	0.17–0.19
CL	A–6	90–100	85–90	55–65	<0.2	[5]	
ML–CL	A–4	90–100	85–95	60–70	0.63–2.0	6.0–7.5	0.18–0.25
ML–CL or GM–GC	A–4	70–85	65–75	45–65	0.63–2.0	6.5–7.5	0.17–0.20
ML–CL	A–4	90–100	85–95	60–70	0.63–2.0	6.0–7.5	0.18–0.25
ML–CL or GM–GC	A–4	70–85	65–75	45–65	0.63–2.0	6.5–7.5	0.17–0.20
ML or CL	A–7, A–6	100	95–100	85–95	0.2–2.0	6.5–7.5	0.20–0.25
CH	A–6, A–7	100	95–100	80–95	<0.2	[6]	0.15–0.20

TABLE 6.—*Estimated properties*

Soil and map symbol	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification
				USDA texture
	Feet	*Feet*	*Inches*	
Lamson very fine sandy loam (Ld). Lamson mucky very fine sandy loam (Le).	8–40	0–½	0–38	Very fine sandy loam or loamy fine sand.
			38–45	Very fine sand
Lansing silt loam (LgB, LgC, LgD).	4–60	3+	0–16	Silt loam
			16–36	Silt loam or silty clay loam.
			36–45	Gravelly loam till
Lima silt loam (LmA, LmB).	3–10	1½–2½	0–21	Silt loam
			21–45	Gritty loam or silt loam till
Lima silt loam, moderately deep variant (LnA, LnB).	1½–3	1½–2½	0–21	Silt loam or loam
			21–30	Gritty loam or silt loam till
			30	Limestone bedrock
Lyons and Appleton silt loams (LoA). Lyons and Kendaia silt loams (LpA). (Estimated properties are for the Lyons soil only. For properties of the Appleton and Kendaia soils, see the respective series.)	5–30	0–1	0–27	Silt loam
			27–40	Gravelly loam till
Madalin silty clay loam (Ma).	5–40	0–½	0–11	Silty clay loam
			11–40	Silty clay or clay
Made land, tillable (Md). Made land and Dumps (Me).	(2)	(2)	(2)	(2)
Manheim silt loam (MhA, MhB).	3½–10	½–2	0–24	Silt loam to silty clay loam
			24–36	Shaly silt loam till
Manlius very shaly silt loam (MlB, MlC, MlD, MlE).	1½–3	2–3+	0–30	Very shaly silt loam or loam
			30+	Fractured shaly bedrock
Marilla shaly silt loam (MmA, MmB, MmC).	3½–10	1½–2½	0–24	Shaly or very shaly silt loam
			24–62	Very shaly loam or silt loam till
Middlebury silt loam (Mn).	4–10	[1] 1½–2	0–42	Silt loam
			42–50	Shaly silt loam
Minoa very fine sandy loam. (Mapped only in an undifferentiated group with Galen soil.)	10–40	½–1½	0–42	Very fine sandy loam
			42–60	Loamy very fine sand
Mohawk silt loam (MoB, MoC, MoD).	3½–10	1½–3	0–26	Shaly silt loam
			26–60	Very shaly silt loam or shaly loam till
Mohawk shaly silt loam, moderately deep variant (MpB, MpC, MpD).	1½ 3½	3+	0–26	Shaly silt loam
			26	Shale bedrock
Muck, deep (Mr).	----------	0	0–42	Muck
Muck, shallow (Ms).	----------	0	0–12	Muck
			12–42	Sand, silt, or clay
Niagara and Collamer silt loams (NaA). (Estimated properties are for Niagara soils only. For properties of the Collamer soils, see the Collamer series.)	4–40	½–1	0–16	Silt loam
			16–26	Silt loam or silty clay loam
			26–36	Stratified silt and very fine sand
Nunda silt loam (NuB, NuC, NuD).	3½–10	1½–3	0–30	Silt loam
			30–45	Silty clay loam
			45–55	Shaly silty clay loam till
Odessa silt loam (OdA, OdB).	15–50	½–1	0–13	Silt loam
			13–31	Silty clay to clay
			31–40	Silty clay loam

See footnotes at end of table.

of the soils—Continued

Classification—Continued		Percentage passing sieve—			Permeability	Reaction	Available moisture capacity
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
					Inches per hour	*pH*	*Inches per inch of soil*
SM-SP, SM	A-2, A-4	80-100	80-100	30-50	0.63-2.0	7.0-7.5	0.13-0.15
SM or ML	A-4	80-100	80-90	40-70	2.0-6.3	7.0-7.5	0.11-0.14
CL	A-4 or A-6	75-90	80-90	55-65	2.0-6.3	5.0-6.0	0.17-0.20
CL	A-4	75-95	65-90	55-65	0.63-2.0	5.5-7.2	0.16-0.20
SM, SC, GM, GC	A-4	65-80	60-70	35-45	<0.2	(5)	0.14-0.16
ML-CL	A-4	85-95	80-95	60-70	0.63-2.0	6.0-7.4	0.16-0.20
ML, CL, or SM-SC	A-4	80-90	70-85	40-60	<0.2	(5)	----------------
ML-CL	A-4	85-95	80-95	60-70	0.63-2.0	6.0-7.4	0.16-0.20
ML, CL, or SM-SC	A-4	80-90	70-85	40-60	<0.2	(5)	----------------
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ML, OL	A-4, A-6	95-100	90-100	85-95	0.63-2.0	6.0-7.4	0.17-0.21
GM, GC	A-2, A-4	60-70	55-75	30-50	<0.2	7.0-7.5	0.13-0.17
ML, CL	A-7	100	95-100	80-95	0.2-2.0	6.0-7.4	0.17-0.19
CL, CH	A-7	100	95-100	85-100	<2.0	(7)	0.15-0.17
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
ML, CL	A-4, A-6	75-95	70-90	55-70	2.0-6.3	6.8-7.2	0.17-0.20
SM, SC	A-2, A-6	75-85	50-65	25-50	0.63-2.0	(5)	----------------
GM, GC	A-4, A-2	55-65	45-70	25-45	2.0-6.3	4.5-7.0	0.12-0.15
					(2)	(8)	0.05-0.01
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ML, CL	A-6, A-7	70-95	65-80	50-80	2.0-63	4.5-5.5	0.12-0.16
SM-SC, GM, GC	A-2, A-4	50-70	40-60	20-40	<0.2	5.0-6.0	----------------
ML	A-4	90-100	80-90	70-80	0.63-2.0	5.0-5.5	0.15-0.19
GM, SM	A-4	55-75	45-60	35-45	0.2-0.63	5.2-5.5	0.08-0.12
SM	A-4	95-100	90-100	40-50	2.0-6.3	5.5-7.0	0.12-0.15
ML, CL	A-4	95-100	90-100	60-80	2.0-6.3	5.5-6.5	
CL	A-6	90-100	85-95	55-70	2.0-6.3	6.0-7.0	0.20-0.25
SM, SC, or GM, GC	A-4	60-80	45-70	30-45	0.63-2.0	(5)	0.15-0.18
CL	A-6	90-100	85-95	55-70	2.0-6.3	6.0-7.0	0.20-0.25
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(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
ML	A-4	90-100	85-100	70-85	0.63-2.0	6.0-7.0	0.20-0.25
ML, CL	A-4	90-100	90-100	75-85	0.20-0.63	6.0-7.0	0.20-0.25
ML, CL	A-4	100	90-100	75-90	0.2-2.0	(5)	0.20-0.25
ML, CL	A-4	95-100	85-90	60-70	0.63-2.0	6.5-7.2	0.15-0.20
ML	A-4	85-95	80-85	55-65	0.20-0.63	7.0-7.5	0.17-0.21
CL	A-6	80-95	80-85	50-60	<0.2	(5)	----------------
CL, CH	A-7	100	95-100	90-95	0.63-2.0	6.5-7.5	0.08-0.1
CH	A-7	100	95-100	90-100	<0.2	(5)	0.05-0.08
CH	A-7	100	95-100	90-100	<0.2	----------------	----------------

TABLE 6.—*Estimated properties*

Soil and map symbol	Depth to bedrock	Depth to seasonally high water table	Depth from surface	Classification — USDA texture
	Feet	*Feet*	*Inches*	
Ontario loam (OnA, OnB, OnC, OnD). Ontario stony loam (OsB, OsC). Ontario and Lansing soils (OrE). (For estimated properties of the Lansing soils, see the Lansing series.)	4–50	3+	0–16	Loam or very fine sandy loam
			16–35	Loam to clay loam
			35 48	Gravelly loam till
Ovid silt loam (OvA, OvB).	6–40	½–1½	0–12	Silt loam
			12–29	Silty clay
			29–36	Gravelly silty clay loam till
Palmyra gravelly loam (PaA, PaB, PaC). Palmyra shaly silt loam (PlA, PlB, PlC).[9] Palmyra and Arkport soils (PkD, PkE). (For estimated properties of the Arkport soil, see the Arkport series.)	10–100	4+	0–17	Gravelly loam
			17–29	Gravelly sandy loam to gravelly clay loam.
			29–45	Very gravelly sandy loam to stratified sand and gravel.
Phelps gravelly loam (PsB). Phelps and Fredon gravelly loams (PrA). (Estimated properties are for the Phelps soils only. For properties of the Fredon soil, see the Fredon series.)	8–30	1–2	0–10	Gravelly loam
			10–30	Gravelly clay loam to loam
			30–45	Stratified sand and gravel
Remsen silt loam (ReA, ReB, ReC). Remsen silty clay loam (RmB3, RmC3, RmD3). Remsen silty clay loam (RmC4). Remsen soils (RnE, RnE4).	3–15	½–1½	0–9	Silt loam
			9–45	Clay
Rhinebeck silt loam (Ro).	10–40	0–1½	0–12	Silt loam
			12–42	Silty clay loam to silty clay
			42–50	Stratified clay, silt, and very fine sand
Rockland, limestone (Rr).				
Romulus silt loam (Rs).	7–20	0–1	0–12	Silty loam
			12–26	Silty clay loam
			26–36	Gravelly silty clay loam till
Schoharie silt loam (SeB). Schoharie silty clay loam (ShC3, ShD3). Schoharie soils (SlE3).	10–60	1½–3	0–11	Silt loam
			11–33	Silty clay to clay
			33–57	Stratified clay and silt
Scio silt loam (SmB).	10–30	1½–2	0–32	Silt loam
			32–40	Silt and a few pebbles
Sloan silt loam (Sn).	10–40	[1] 0–1	0–25	Silt loam
			25–40	Silty clay loam
Stafford loamy fine sand (StA).	4–30	½–1½	0–30	Loamy fine sand
			30–36	Fine sand
Warners loam (Wr).	10–40	0	0–6	Mucky loam
			6–42	Marl
Wayland silt loam (Wa).	6–40	[1] 0	0–25	Silt loam
			25–40	Stratified silt and sandy loam

[1] Subject to flooding.
[2] Variable.
[3] Alkaline to calcareous.
[4] Seasonally high above bedrock.
[5] Calcareous.

of the soils—Continued

Classification—Continued		Percentage passing sieve—			Permeability	Reaction	Available moisture capacity
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
					Inches per hour	*pH*	*Inches per inch of soil*
ML, SM, or SC	A–4	75–95	75–85	40–55	0. 63–2. 0	5. 5–6. 5	0. 16–0. 20
ML or CL	A–4	90–95	85–90	50–60	0. 20–2. 0	5. 5–7. 5	0. 14–0. 16
SM or SC	A–4	75–85	70–85	40–50	<0. 63	[6]	----------
ML	A–4 or A–6	90–100	80–95	60–75	0. 63–2. 0	6. 0–7. 2	0. 12–0. 15
CL	A–6 or A–7	90–100	80–95	65–90	0. 2–0. 63	6. 5–7. 5	0. 16–0. 20
CL	A–4 or A–6	80–90	75–85	55–70	0. 2–0. 63	[5]	----------
ML	A–4	80–85	70–80	50–60	2. 0–6. 3	5. 0–7. 2	0. 12–0. 15
GM, GC	A–2, A–4	40–50	35–40	10–40	2. 0–6. 3	5. 5–7. 5	0. 15–0. 18
GM, GP, GC	A–2	40–50	35–40	5–30	>6. 3	[5]	----------
GM	A–4	65–75	55–65	35–45	2. 0–6. 3	6. 0–6. 2	0. 15–0. 17
ML, CL, or GC	A–4	65–75	50–60	45–55	0. 63–2. 0	6. 2–6. 6	0. 16–0. 20
GM–GC, GM	A–2	50–60	40–50	25–35	>6. 3	6. 5–7. 0	----------
MH or OH	A–7	----------	100	90–95	0. 63–2. 0	5. 0–6. 0	0. 12–0. 16
CL	A–6, A–7	----------	100	100	<0. 2	[5]	0. 10–0. 14
ML, CL	A–6	90–100	90–100	85–95	0. 2–0. 63	6. 0–7. 2	0. 17–0. 20
CL	A–6	85–100	80–95	75–95	<0. 2	6. 5–7. 5	0. 16–0. 18
CL	A–6	90–100	90–100	85–95	<0. 2	[5]	0. 16–0. 18
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CL	A–7	90–100	90–100	80–90	0. 63–2. 0	6. 5–7. 2	0. 17–0. 20
CL	A–7	85–100	85–95	80–90	0. 2–0. 63	6. 5–7. 5	0. 15–0. 18
CL	A–7	80–90	75–85	50 70	<0. 2	[5]	----------
CL	A–6 or A–7	100	95–100	90–95	0. 63–2. 0	5. 5–7. 0	0. 17–0. 20
CL, CH	A–6 or A–7	100	95–100	95–100	0. 63	6. 0–7. 5	0. 16–0. 18
CL, CH	A–6	100	95–100	95–100	<0. 2	[6]	0. 16–0. 18
ML	A–4	100	90–100	60–80	0. 63–2. 0	5. 0–5. 9	0. 16–0. 21
ML	A–4	100	75–90	55–65	0. 63–6. 3	6. 0–6. 5	0. 14–0. 16
ML	A–6	100	100	65–80	0. 63–2. 0	6. 5–7. 5	0. 15–0. 19
CL	A–6	70–90	65–80	70–80	0. 2–0. 63	6. 9–7. 4	0. 17–0. 20
SM	A–2	100	90–100	15–35	>6. 3	5. 0–6. 0	0. 08–0. 10
SP–SM or SM	A–2	100	95–100	12–20	>6. 3	5. 0–6. 0	0. 10 0. 12
Pt	[2]	[2]	[2]	[2]	2. 0–6. 3	6. 5–7. 5	[2]
OL	[2]	[2]	[2]	[2]	[2]	[5]	----------
ML–CL	A–4	100	80–100	70–80	0. 63–2. 0	6. 5–6. 8	0. 16–0. 19
ML	A–4	100	80–100	55–65	0. 63–2. 0	7. 0–7. 5	0. 11–0. 14

[6] pH 7.0 to calcareous.
[7] pH 6.5 to calcareous.
[8] pH 4.5 to calcareous.
[9] Similar to Palmyra gravelly loam, but surface layer is shaly silt loam and underlying layers contain shale fragments instead of gravel.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Alden mucky silt loam (Ad).	Fair to good	Unsuitable	Unsuitable in surface layer; otherwise good.	Highly organic surface layer; flat or depressional relief; high water table.	Subject to seepage; slopes unstable.	Generally adequate strength for high embankments.
Allis silty clay loam, deep (AeA).	Fair	Unsuitable	Poor	Moderately deep to deep over bedrock; high water table.	Bedrock encountered in most cuts; subject to seepage.	Adequate strength for high embankments.
Alluvial land (Al).	Variable; high water table.	Generally unsuitable.	Variable; high water table.	Subject to flooding; high water table.	Subject to flooding; slopes unstable.	Variable strength.
Angola silt loam (AnA, AnB).	Poor to fair	Unsuitable	Good	Bedrock at depth of 18 to 36 inches.	Bedrock encountered in most cuts; subject to seepage.	Adequate strength for high embankments.
Appleton silt loam (ApB).	Fair	Unsuitable	Good	Seasonally high water table.	Subject to seepage; slopes unstable; seasonally high water table; bedrock may be encountered in deep cuts.	Generally adequate strength for high embankments.
Arkport very fine sandy loam (ArB, ArC). Arkport and Dunkirk soils (AsD, AsE). (Interpretations are for Arkport soils only. For interpretations of Dunkirk soils, see the Dunkirk series.)	Fair	Fair for sands	Good	Subject to differential frost heaving.	Cut slopes subject to seepage and sloughing; highly erodible.	Generally adequate strength for low embankments; low to moderately high compressibility.
Benson soils (BeB, BeD, BeE).	Poor	Unsuitable	Good; generally low yield of soil material per acre.	Shallow to bedrock.	Shallow to bedrock.	Adequate strength for high embankments.

engineering properties of soils

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally stable; low compressibility; high water table.	High water table; subject to ponding; slow permeability.	High water table; slow permeability.	Surface layer high in organic-matter content; stability good below depth of 16 to 31 inches; slow permeability.	High water table; slowly permeable layer below depth of 31 inches; cut slopes subject to seepage and sloughing.	Generally not irrigated.	Depressional relief.	Depressional relief.
Generally stable; bedrock encountered in most excavations.	High water table; slow permeability.	Slow permeability; moderately deep to bedrock in places.	Poor stability; subject to shrinking and swelling; little soil material available per acre.	High water table; slow permeability; natural outlets inadequate in most places.	Generally not irrigated.	Flat or depressional relief.	Subject to prolonged flow.
Variable stability.	Subject to flooding.	Subject to flooding; may be permeable.	Material variable.	Subject to flooding.	Subject to flooding.	Not needed	Not needed.
High bearing capacity; bedrock encountered in most excavations.	Seasonally high water table; shale or sandstone bedrock at depth of 18 to 36 inches.	Bedrock at depth of 18 to 36 inches.	Stability good above bedrock; little soil material available per acre.	Bedrock at depth of 18 to 36 inches.	Generally not irrigated.	Bedrock at depth of 18 to 36 inches.	Subject to prolonged flow.
Generally fair stability; generally low compressibility.	Slow permeability; seasonally high water table.	Slow permeability.	Good stability; slow permeability.	High water table; slow permeability.	Seasonally high water table restricts rooting depth.	Generally no adverse features.	Subject to prolonged flow.
Variable stability; large settlements possible under heavy or vibratory loads.	Moderately rapid permeability.	Moderately rapid permeability.	Fair to poor stability; poorly graded fine sand, subject to piping; highly erodible.	Moderately rapid permeability.	Good water-intake rate; moderate available moisture capacity.	Moderately rapid permeability; short slopes.	Moderately rapid permeability; highly erodible.
Stable; shallow to bedrock.	Limestone bedrock at depth of 10 to 20 inches.	Shallow to bedrock.	Shallow to bedrock.	Not needed	Limited rooting depth.	Shallow to bedrock.	Shallow to bedrock.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Burdett silt loam (BuA, BuB).	Poor	Unsuitable	Good	Seasonally high water table.	Slopes subject to sloughing and seepage.	Generally adequate strength for high embankments.
Canandaigua silt loam (CaA). Canandaigua mucky silt loam (CdA).	Fair	Unsuitable	Fair below surface layer.	High water table; drainage difficult.	Unstable below water table.	Generally adequate strength for low embankments; moderately high compressibility.
Cazenovia silt loam (CeA, CeB, CeC). Cazenovia silty clay loam (CgC3, CgD3).	Fair	Unsuitable	Fair	Seasonally high water table.	Cut slopes may be unstable.	Generally adequate strength for moderately high embankments.
Chenango shaly silt loam (ChA, ChB, ChC).	Poor	Poor	Fair to good	Generally no adverse features.	Slopes subject to sloughing and seepage; highly erodible if sandy.	Generally adequate strength for moderately high embankments.
Collamer silt loam (ClB).	Good	Unsuitable	Good; highly erodible.	Seasonally high water table.	Subject to seepage; slopes unstable.	Generally adequate strength for low embankments; moderately high compressibility.
Colonie loamy fine sand (CmB, CmC).	Poor	Generally unsuitable.	Good; highly erodible.	Generally no adverse features.	Cut slopes highly erodible.	Generally adequate strength for low embankments.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally stable; low compressibility.	Seasonally high water table; slow permeability.	Slow permeability.	Good stability; slow permeability.	Slow permeability.	Seasonally high water table; fair water-intake rate; restricted root zone.	Generally no adverse features.	Subject to prolonged flow.
Generally unstable; variable compressibility; high water table.	High water table; stratified silt and clay layers restrict water movement.	Prolonged high water table; sand lenses subject to seepage.	Stability fair below surface layer; slow permeability.	High water table; stratified sands subject to piping; natural outlets inadequate in places.	Not applicable.	Not applicable.	Not applicable.
Fair stability; variable compressibility.	High water table; slow permeability. CgD3: moderately steep slopes.	Slow permeability. CgD3: moderately steep slopes.	Fair stability; slow permeability; poor workability when wet.	Slowly permeable layer at depth of 12 inches; cut slopes subject to seepage. CgD3: moderately steep slopes.	Moderately slow water-intake rate; high available moisture capacity. CgD3: moderately steep slopes.	Irregular relief. CgD3: moderately steep slopes.	Erodible on stronger slopes.
Variable stability, depending on character of underlying material; large settlements possible under heavy or vibratory loads.	Rapid permeability.	Rapid permeability.	Stability fair to good; coarse material may consist of weak shale particles; may be permeable.	Rapid permeability.	Good water-intake rate; moderate available moisture capacity.	Not applicable.	Rapid permeability.
Generally unstable; variable compressibility; may be underlain by wet, compressible soil material.	Seasonally high water table; moderately slow permeability.	Sand layers subject to excess seepage.	Stability fair to poor; highly erodible.	Cut slopes unstable; fine sand and silt subject to piping.	Good water-intake rate; high available moisture capacity.	Generally no adverse features.	Erodible.
Fair stability; variable compressibility; large settlements possible under heavy or vibratory loads.	Rapid permeability.	Rapid permeability.	Fine sand may be unstable; rapid permeability; very erodible.	Rapid permeability.	Good water-intake rate; low available moisture capacity.	Rapid permeability.	Highly erodible.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Conesus silt loam (CoA, CoB, CoC).	Poor	Unsuitable	Good	CoA: seasonally high water table. CoB, CoC: no adverse features.	Generally good; bedrock may be encountered in some cuts.	Generally adequate strength for high embankments.
Darien silt loam (DaA, DaB, DaC, DaD).	Poor	Unsuitable	Good	Seasonally high water table; bedrock may be encountered in deep cuts.	Subject to seepage; slopes unstable.	Generally adequate strength for high embankments.
Dunkirk silt loam (DuB, DuC).	Good	Unsuitable	Good; highly erodible.	Generally no adverse features.	Cut slopes very unstable.	Generally adequate strength for low embankments; low to moderately high compressibility.
Edwards muck (Ed).	Possible use as amendment for mineral soils.	Unsuitable	Unsuitable	Highly organic soils; prolonged high water table.	Unstable subgrade and cut slopes.	Very low strength; generally wet; high water table; high compressibility; severe settlement conditions.
Eel silt loam (Ee).	Generally good.	Unsuitable	Generally unsuitable.	Subject to flooding.	Subject to flooding; unstable subgrade and cut slopes.	Variable strength.
Elnora loamy fine sand (ElB).	Poor	Fair for sand; unsuitable for gravel.	Good; highly erodible; may be wet in natural state.	Seasonally high water table.	Cut slopes and subgrade unstable below water table; subgrade subject to differential frost heaving.	Variable strength; may be underlain by wet compressible materials.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally stable; low compressibility.	Seasonally high water table; moderately slow permeability.	Moderately slow permeability; seasonally high water table.	Good shear strength and stability; slow permeability if compacted.	Moderately slow permeability below depth of 36 inches.	Good water-intake rate; high available moisture capacity.	Generally no adverse features.	Erodible on stronger slopes; subject to seepage.
Generally stable; generally low compressiblity.	Seasonally high water table; clay layer impedes internal drainage. DaD: moderately steep slopes.	Slow permeability. DaD: moderately steep slopes.	Fair to poor stability; coarse material consists of soft shale particles; slow permeability; poor workability when wet.	Cut slopes subject to seepage and sloughing; slow internal drainage. DaD: moderately steep slopes.	Fair water-intake rate; high available moisture capacity. DaD: moderately steep slopes..	Undulating relief.	Subject to prolonged flow. DaD: moderately steep slopes.
Generally unstable; variable compressibility.	Seasonally high water table; moderately slow permeability.	Sand layers subject to excess seepage.	Fair shear strength and stability; slow permeability when compacted.	Cut slopes unstable; stratified sand and silt layers subject to piping.	Good water-intake rate; high available moisture capacity.	Irregular relief; erodible.	Highly erodible.
Very unstable; highly compressible.	Prolonged high water table.	Permeability variable.	Very poor stability; highly compressible.	Very high shrinkage when first drained; underlying marl at depth of 12 to 42 inches; locally, bedrock at 40-inch depth.	Good water-intake rate; high available moisture capacity.	Not needed---	Not needed.
Variable stability.	Subject to flooding; high water table; permeability variable.	High water table; permeable.	Fair to poor stability.	Subject to annual flooding; cut slopes unstable; natural outlets inadequate in places.	Subject to flooding.	Subject to flooding.	Subject to flooding.
Variable stability, depending on character of underlying material; large settlements possible under heavy or vibratory loads; subject to seepage.	Seasonally high water table; rapid permeability.	Rapid permeability.	Fair to poor stability; poorly graded fine sands subject to piping; highly erodible.	Cut slopes very unstable; fine sand subject to piping; seasonally high water table.	Good water-intake rate; low available moisture capacity.	Rapid permeability; subject to soil blowing.	Rapid permeability; highly erodible.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Fonda mucky silt loam (Fo).	Good to fair; seasonally wet.	Unsuitable	Fair to poor	Surface layer high in organic-matter content; prolonged high water table.	Prolonged high water table; cut slopes unstable; bedrock may be encountered in deep cuts.	Variable strength and compressibility.
Fremont silt loam (FrA, FrB, FrC).	Fair to poor	Unsuitable	Fair to good	Seasonally high water table; bedrock encountered in deep cuts.	Subject to seepage; slopes unstable.	Generally adequate strength for moderately high embankments.
Fresh water marsh (Fw).	Unsuitable	Unsuitable	Unsuitable	Permanently flooded.	Permanently flooded.	Soft for foundations in some places.
Galen and Minoa very fine sandy loams (GmA). Galen very fine sandy loam (GnB). (Interpretations are for both the Galen and the Minoa soils.)	Poor to fair	Unsuitable	Good; may be wet in natural state; highly erodible.	Seasonally high water table.	Cut slopes and subgrade unstable below water table.	Generally adequate strength for low embankments.
Genesee silt loam (Gs).	Good to excellent.	Possibly suitable in lower layers.	Generally unsuitable.	Subject to flooding.	Subject to flooding; cut slopes unstable.	Variable strength; may be underlain by compressible material.
Halsey silt loam (HaA).	Fair to good	Fair	Good; highly erodible if sandy.	Prolonged high water table.	Prolonged high water table; cut slopes unstable; subgrade subject to differential frost heaving.	Generally adequate strength for moderately high embankments; may be underlain by wet, compressible material.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Variable stability; prolonged high water table.	Subject to ponding; slow permeability.	Prolonged high water table; permeability slow.	Poor stability; surface layer high in organic-matter content; poor workability.	Cut slopes unstable; slow internal water movement; natural outlets inadequate in places.	Generally not irrigated.	Depressional relief.	Depressional relief.
Generally fair stability; low compressibility.	Seasonally high water table; slow permeability.	Bedrock may be encountered below depth of 40 inches.	Good stability; slow permeability.	Slow internal water movement.	Limited rooting depth; moderate to good water-intake rate; high available moisture capacity.	Subject to prolonged flow.	Highly erodible on stronger slopes.
Variable stability.	Permanently flooded.	Permanently flooded.	Permanently flooded.	Permanently flooded.	Permanently flooded.	Permanently flooded.	Permanently flooded.
Variable stability, depending on character of underlying material; variable compressibility; large settlements possible under heavy or vibratory loads; subject to seepage.	Seasonally high water table; moderate permeability.	Moderate permeability.	Poor stability; may be permeable; very erodible; fine sand subject to piping.	Cut slopes very unstable; fine sand subject to piping. Minoa: natural outlets may be inadequate.	Good water-intake rate; moderate available moisture capacity.	Nearly level slopes.	Highly erodible.
Subject to flooding; variable stability.	Subject to annual flooding; moderate permeability.	Moderate permeability.	Fair stability; permeability slow when compacted.	Cut slopes unstable; fine sand subject to piping; natural outlets may be inadequate.	Subject to flooding.	Subject to flooding.	Subject to flooding
Generally moderately stable; large settlements possible under heavy or vibratory loads; subject to seepage.	Prolonged high water table; rapid permeability.	Permeability rapid in stratified sand and gravel.	Good stability; may be permeable.	High water table; may contain sand lenses subject to piping; natural outlets inadequate in places.	Prolonged high water table; generally not irrigated.	High water table; nearly level slopes.	High water table.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Hilton loam (HlA, HlB).	Fair to good	Unsuitable	Good	Seasonally high water table.	Bedrock may be encountered in deep cuts.	Generally adequate strength for high embankments.
Holly silt loam (Hm).	Good to fair; seasonally wet.	Unsuitable	Generally unsuitable.	Subject to flooding; prolonged high water table.	Subject to flooding.	Variable strength and stability.
Honeoye silt loam, moderately deep variant (HnB).	Poor; generally contains rock fragments.	Unsuitable	Good; low yield of soil material per acre.	Thin soil layer over bedrock.	Rock encountered in shallow cuts.	Adequate strength for high embankments.
Hornell silty clay loam (HoB3, HoC3). Hornell and Fremont soils (HsD3). (Interpretations are for both the Hornell and the Fremont soils).	Poor	Unsuitable	Good	Thin soil layer over bedrock; seasonally high water table.	Subject to seepage; slopes unstable.	Generally adequate strength for moderately high enbankments.
Ilion silt loam (IoA, IoB).	Poor	Unsuitable	Good; may be wet in natural state.	Prolonged high water table; bedrock may be encountered in deep cuts.	Subject to seepage; slopes unstable.	Generally adequate strength for high embankments.
Kendaia silt loam, moderately deep variant (KeA).	Fair; may contain gravel.	Unsuitable	Good; low yield of soil material per acre.	Thin soil layer over bedrock.	Subject to seepage; slopes unstable.	Generally adequate strength for moderately high embankments.
Lakemont silty clay loam (La).	Poor; clayey	Unsuitable	Poor	Highly organic surface layer; prolonged high water table; flat or depressional relief.	Unstable subgrade and cut slopes; natural drainage outlets inadequate.	Very low strength; moderately high to high compressibility

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally stable; low compressibility.	Seasonally high water table; moderately slow permeability.	Moderately slow permeability.	Good stability; slow permeability when compacted.	Generally no adverse features.	Good water-intake rate; high available moisture capacity.	May be stony.	Subject to prolonged flow.
Not applicable.	High water table; subject to frequent flooding.	Subject to annual flooding; prolonged high water table.	Fair stability; slow permeability when compacted.	Subject to annual flooding; may contain sand lenses; subject to piping; natural outlets may be inadequate.	Subject to frequent flooding; generally not irrigated.	Nearly level slopes.	Nearly level relief; subject to flooding.
Stable; bedrock encountered in most excavations.	Limestone bedrock at depth of 20 to 36 inches; material above bedrock moderately permeable.	Moderately deep to limestone bedrock; subject to excess seepage.	Stability good above bedrock; slow permeability when compacted.	Moderately deep to bedrock; generally not needed.	Limited rooting depth.	Moderately deep to bedrock.	Moderately deep to bedrock.
Generally stable; low compressibility; bedrock encountered in most excavations.	Shale bedrock at depth of 20 to 36 inches. HsD3: steep slopes.	Shale bedrock encountered in shallow excavations. HsD3: steep slopes.	Fair to poor stability; slow permeability; contains high percentage of soft shale fragments; poor workability when wet.	Shale bedrock at depth of 20 to 36 inches. HsD3: steep slopes.	Limited rooting depth; slow water-intake rate; generally not irrigated. HsD3: steep slopes.	Moderately deep to bedrock.	Highly erodible. HsD3: steep slopes.
Generally stable; low compressibility.	Prolonged high water table; slow permeability.	Slow permeability.	Fair to poor stability; slow permeability.	Prolonged high water table; cut slopes unstable; slow internal water movement.	Prolonged high water table; generally not irrigated.	Subject to prolonged flow.	Subject to prolonged flow.
Generally stable; low compressibility; bedrock encountered in most excavations.	Seasonally high water table; shale or limestone bedrock at depth of 18 to 36 inches.	Bedrock encountered in shallow excavations.	Limited yield of soil material per acre.	Moderately deep to bedrock.	Limited rooting depth.	Moderately deep to bedrock.	Moderately deep to bedrock.
Very low stability; severe seepage.	Prolonged high water table; slow permeability.	Prolonged high water table; slow permeability.	Very poor stability; slow permeability; subject to shrinking and swelling; poor workability when wet.	Cut slopes very unstable; slow internal water movement; natural outlets may be inadequate.	Prolonged high water table; generally not irrigated.	Level or depressional relief.	Level or depressional relief.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of —			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Lamson very fine sandy loam (Ld). Lamson mucky very fine sandy loam (Le).	Good; seasonally wet.	Unsuitable	Fair; may be wet in natural state; highly erodible.	Prolonged high water table; flat or depressional relief.	Unstable subgrade and cut slopes; natural drainage outlets inadequate.	Very low strength; moderately high compressibility.
Lansing silt loam (LgB, LgC, LgD).	Poor to fair; generally contains rock fragments.	Unsuitable	Good	Bedrock may be encountered in deep cuts.	Cut slopes erodible.	Generally adequate strength for high embankments.
Lima silt loam (LmA, LmB). Lima silt loam, moderately deep variant (LnA, LnB).	Poor to fair; may have a high stone content.	Unsuitable	Good. LnA, LnB: low yield of soil material per acre.	Seasonally high water table. LnA, LnB: thin soil layer over bedrock.	LnA, LnB: bedrock encountered in shallow cuts; slopes subject to seepage.	Generally adequate strength for high embankments.
Lyons and Appleton silt loams (LoA). Lyons and Kendaia silt loams (LpA). (Interpretations are for the Lyons, the Appleton, and the Kendaia soils.)	Fair to good; may be wet in natural state; may contain stone fragments.	Unsuitable	Unsuitable in surface layer; good below depth of 18 to 30 inches.	Prolonged high water table; flat or depressional relief.	Subject to seepage; slopes unstable; natural drainage outlets inadequate in places.	Generally adequate strength for high embankments.
Madalin silty clay loam (Ma).	Poor	Unsuitable	Poor	May have highly organic surface layer; prolonged high water table; flat or depressional relief.	Prolonged high water table; unstable subgrade and cut slopes.	Very low strength; moderately high to high compressibility.
Made land, tillable (Md). Made land and Dumps (Me).	([1])	([1])	([1])	([1])	([1])	([1])
Manheim silt loam (MhA, MhB).	Poor; generally contains rock fragments.	Unsuitable	Good; may be wet in natural state.	Some areas have nearly flat relief; seasonally high water table.	Subject to seepage; slopes unstable; bedrock may be encountered in deep cuts.	Generally adequate strength for high embankments.

See footnote at end of table.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally unstable; large settlements possible; severe seepage.	Prolonged high water table; permeable.	Prolonged high water table; permeable.	Stability fair to poor, depending on gradation of the sandy material; very erodible.	Cut slopes very unstable; fine sand subject to piping; natural outlets may not be adequate.	Prolonged high water table; generally not irrigated.	Level or depressional relief.	Level or depressional relief.
Generally stable; low compressibility.	Slow permeability. LgD: steep slopes.	Slow permeability. LgD: steep slopes.	Good stability and shear strength; slow permeability.	Except for small wet spots, drainage generally not needed.	Good water-intake rate; high available moisture capacity. LgD: steep slopes.	Generally no adverse features. LgD: steep slopes.	Erodible on stronger slopes. LgD: steep slopes.
Generally stable; low compressibility.	Seasonally high water table; slow permeability. LnA, LnB: bedrock at depth of 18 to 36 inches.	Slow permeability. LnA, LnB: bedrock at depth of 18 to 36 inches.	Good stability and shear strength; slow permeability when compacted. LnA, LnB: low yield of soil material per acre.	Except for small wet spots, drainage generally not needed. LnA, LnB: bedrock at depth of 18 to 30 inches.	Good water-intake rate; high available moisture capacity. LnA, LnB: limited rooting depth.	LnA, LnB: bedrock at depth of 18 to 36 inches.	Prolonged flow; erodible on stronger slopes.
Generally fair stability; low compressibility; severe seepage.	High water table; slow permeability.	Slow permeability; high water table; subject to ponding.	Good stability and shear strength when compacted; slow permeability.	High water table; natural outlets may be inadequate.	Prolonged high water table; generally not irrigated.	Flat or depressional relief.	Flat or depressional relief.
Generally unstable; high compressibility; severe seepage.	Subject to ponding; slow permeability.	Prolonged high water table; slow permeability.	Poor stability; slow permeability; poor workability.	Cut slopes unstable; slow internal water movement; natural outlets inadequate.	Prolonged high water table; generally not irrigated.	Depressional relief.	Depressional relief.
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1).
Generally stable; low compressibility.	Seasonally high water table; moderate permeability.	Moderate permeability.	Stability good to fair, depending on durability of shale fragments; slow permeability.	Seasonally high water table; cut slopes may be unstable; moderate internal water movement.	Good water-intake rate; high available moisture capacity; seasonally high water table.	Generally no adverse features.	Highly erodible on stronger slopes.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Manlius very shaly silt loam (MIB, MIC, MID, MIE).	Poor	Unsuitable	Good; generally low yield of soil material per acre.	Thin soil layer over bedrock.	Rock encountered in shallow cuts; subject to seepage.	Adequate strength for high embankments.
Marilla shaly silt loam (MmA, MmB, MmC).	Poor; contains rock fragments.	Unsuitable	Good	Firm, dense, slowly permeable; shaly layer at depth of 1½ to 3½ feet.	Seasonally high water table; bedrock may be encountered in deep cuts.	Generally adequate strength for high embankments.
Middlebury silt loam (Mn).	Good; may be wet in natural state.	Unsuitable	Good when dry.	Subject to flooding; seasonally high water table.	Subject to flooding.	Generally adequate strength for low embankments.
Mohawk silt loam (MoB, MoC, MoD).	Generally poor; contains rock fragments.	Unsuitable	Good	Seasonally high water table.	Subject to seepage; slopes unstable.	Generally adequate strength for high embankments.
Mohawk shaly silt loam, moderately deep variant (MpB, MpC, MpD).	Poor; contains many rock fragments.	Unsuitable	Good; low yield of soil material per acre.	Shale bedrock at depth of 18 to 36 inches.	Subject to seepage; slopes unstable; bedrock encountered in cuts.	Generally adequate strength for high embankments.
Muck, deep (Mr). Muck, shallow (Ms).	Possible use as amendment for mineral soils.	Unsuitable	Unsuitable	Highly organic material; prolonged high water table.	Very unstable; natural drainage outlets inadequate.	Very poor; very low strength; generally wet; high water table; high compressibility; severe settlement conditions.

engineering properties of soils—Continued

Soil features that affect engineering—Continued								
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Stable; bedrock encountered in most excavations.	Shale bedrock at depth of 18 to 30 inches; permeability of material above bedrock moderate to rapid. MID, MIE: steep slope.	Bedrock encountered in shallow excavations. MID, MIE: steep slopes.	Stability variable and depends on shale fragments; little soil material available per acre.	Bedrock at depth of 18 to 30 inches. MID, MIE: steep slopes.	Limited rooting depth. MID, MIE: steep slopes.	Bedrock at depth of 18 to 30 inches.	Bedrock at depth of 18 to 30 inches. MID, MIE: steep slopes.
Generally stable; low compressibility.	Seasonally high water table; slow permeability.	Slow permeability.	Stability variable and depends on soundness of shale particles; permeability slow when compacted.	Seasonally high water table.	Fair to good water-intake rate; moderate available moisture capacity.	Very shaly	Subject to prolonged flow.
Variable stability; may be underlain with wet, compressible material; severe seepage.	Subject to flooding.	Seasonally high water table; moderately slow permeability.	Good stability; slow permeability when compacted.	Subject to flooding; cut slopes unstable; natural outlets inadequate.	Subject to flooding.	Subject to flooding.	Subject to flooding.
Generally stable; low compressibility.	Moderate permeability. MoD: moderately steep slopes.	Moderate permeability. MoD: moderately steep slopes.	Good stability; slow permeability when compacted.	Generally not needed; moderate internal water movement. MoD: moderately steep slopes.	Fair water-intake rate; high available moisture capacity. MoD: moderately steep slopes.	Short, irregular slopes. MoD: moderately steep slopes.	Short, irregular slopes. MoD: moderately steep slopes.
Generally stable; low compressibility.	Shale bedrock at depth of 18 to 36 inches. MpD: steep slopes.	Shale bedrock at depth of 18 to 36 inches.	Stability variable, depending on durability of shale fragments; slow to moderately slow permeability when compacted.	Generally not needed; moderately slow internal water movement; shallow to shale. MpD: moderately steep slopes.	Generally not irrigated. MpD: moderately steep slopes.	Bedrock at depth of 18 to 36 inches. MpD: moderately steep slopes.	Erodible. MpD: steep slopes.
Very low stability; high compressibility; severe seepage.	Prolonged high water table.	Variable permeability.	Very poor stability; highly compressible.	Very high shrinkage when first drained; underlying material at variable depth.	Good water-intake rate; high available moisture capacity.	Level relief	Level relief.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Niagara and Collamer silt loams (NaA). (Interpretations are for both the Niagara and the Collamer soils.)	Good	Unsuitable	Good when dry; highly erodible.	Seasonally high water table.	Cut slopes and subgrade unstable.	Generally adequate strength for low embankments; moderately high compressibility.
Nunda silt loam (NuB, NuC, NuD).	Good	Unsuitable	Fair to poor; clayey.	Variable thickness of silty material over firm, dense, shaly layer.	Cut slopes subject to seepage and sloughing.	Generally adequate strength for moderately high embankments.
Odessa silt loam (OdA, OdB).	Fair; may be clayey.	Unsuitable	Poor to fair when dry.	Seasonally high water table.	Generally unstable subgrades and cut slopes.	Generally adequate strength for low embankments; variable compressibility.
Ontario loam (OnA, OnB, OnC, OnD). Ontario and Lansing soils (OrE). Ontario stony loam (OsB, OsC). (Interpretations are for both the Ontario and the Lansing soils.)	OnA, OnB, OnC, OnD, OrE: fair to poor; may contain rock fragments. OsB, OsC: unsuitable; very stony.	Unsuitable	OnA, OnB, OnC, OnD, OrE: good; may be bouldery with depth. OsB, OsC: fair; very bouldery.	OnA: nearly flat slopes. OrE: very steep slopes.	Cut slopes subject to seepage and sloughing; bedrock encountered in some cuts.	Generally adequate strength for high embankments.
Ovid silt loam (OvA, OvB).	Fair to good; may be too clayey.	Unsuitable	Fair	Seasonally high water table.	Subgrade subject to differential frost heaving.	Generally adequate strength for high embankments.
Palmyra gravelly loam (PaA, PaB, PaC). Palmyra and Arkport soils (PkD, PkE). (Interpretations are for Palmyra soils only. For interpretations of Arkport soils, see the Arkport series.)	Poor	Good for gravel.	Good	Generally no adverse features. PkE: very steep slopes.	Subject to seepage; cut slopes generally stable above water table; subgrade subject to differential frost heaving.	Generally adequate strength for low embankments.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Variable stability, depending on character of underlying material; variable compressibility.	Seasonally high water table; moderate permeability; subject to runoff from surrounding soils.	Sand layers subject to excess seepage in dry periods.	Fair to poor stability; highly erodible; very fine sand; subject to piping.	Seasonally high water table; cut slopes subject to seepage and sloughing; very fine sands subject to piping.	Fair to good water-intake rate; high available moisture capacity.	Level relief	Level relief.
Generally moderately stable; low compressibility.	Seasonally high water table; slow permeability. NuD: steep slopes.	Slow permeability. NuD: steep slopes.	Fair to poor stability; slow permeability when compacted.	Slow permeability; small wet areas subject to prolonged seepage. NuD: steep slopes.	Fair water-intake rate; high available moisture capacity. NuD: steep slopes.	Subject to prolonged seepage.	Subject to prolonged flow; erodible on steep slopes. NuD: steep slopes.
Generally unstable; variable compressibility.	Prolonged high water table; slow permeability.	High water table; slow permeability.	Poor stability; subject to shrinking and swelling; slow permeability; poor workability.	High water table; cut slopes unstable; slow to very slow internal drainage.	Prolonged high water table.	Prolonged high water table; erodible.	Subject to prolonged flow; erodible.
Generally stable; low compressibility.	Moderately slow to slow permeability. OnD, OrE: very steep slopes. OsB, OsC: may be shallow to bedrock.	Sand layers subject to excess seepage. OnD, OrE: very steep slopes. OsB, OsC: may be shallow to bedrock.	Good stability; slow permeability when compacted. OsB, OsC: very stony.	Generally not needed.	Good water-intake rate; moderate available moisture capacity on milder slopes. OnD, OrE: very steep slopes.	OnD, OrE: very steep slopes. OsB, OsC: very stony.	Erodible on steep slopes. OnD, OrE: very steep slopes.
Generally stable; generally low compressibility.	Seasonally high water table; moderately slow to slow permeability.	Seasonally high water table; moderately slow to slow permeability.	Good stability; slow permeability when compacted; poor workability when wet.	Cut slopes subject to erosion; slow internal water movement.	Moderately slow water-intake rate; moderate to high available moisture capacity.	Generally no adverse features.	Subject to prolonged flow; erodible.
Variable stability, depending on character of underlying material; large settlements possible under heavy or vibratory loads.	Moderately rapid to very rapid permeability. PkD, PkE: steep slopes.	Rapid permeability. PkD, PkE: steep slopes.	Very good stability and shear strength; permeable.	Generally not needed.	Good water-intake rate; moderate available moisture capacity. PkD, PkE: steep slopes.	Rapid permeability.	Erodible on steep slopes; gravelly. PkD, PkE: steep slopes.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Palmyra shaly silt loam (PlA, PlB, PlC).	Poor	Unsuitable	Fair	Generally no adverse features.	Subject to seepage; cut slopes generally stable above water table; subgrade subject to differential frost heaving.	Generally adequate strength for low embankments.
Phelps and Fredon gravelly loams (PrA). Phelps gravelly loam (PsB). (Interpretations are for both the Phelps and the Fredon soils.)	Poor.	Generally good.	Good; highly erodible if sandy.	Seasonally high water table.	Subject to seepage; cut slopes generally stable above water table. PrA: high water table may be encountered; subgrade subject to differential frost heaving.	Generally adequate strength for low embankments.
Remsen silt loam (ReA, ReB, ReC). Remsen silty clay loam (RmB3, RmC3, RmD3).	Fair to poor; may be clayey.	Unsuitable	Fair; may be wet in natural state; may be clayey.	Seasonally high water table.	High clay content; cut slopes may be unstable.	Generally adequate strength for low embankments; variable compressibility.
Remsen silty clay loam (RmC4). Remsen soils (RnE, RnE4).	Very poor.	Unsuitable	Fair; may be wet in natural state; high clay content.	Seasonally high water table. RnE, RnE4: very steep slopes.	High clay content; cut slopes may be unstable.	Generally adequate strength for low embankments.
Rhinebeck silt loam (Ro).	Poor to fair; may be too clayey.	Unsuitable	Poor	Seasonally high water table; subject to occasional flooding.	Generally unstable subgrades and cut slopes.	Generally adequate strength for low embankments; moderately high compressibility.
Rockland, limestone (Rr).	Unsuitable	Unsuitable unless processed.	Good; requires blasting.	Steep slopes in places.	Subject to seepage in places.	Adequate strength for high embankments.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Variable stability, depending on character of underlying material; large settlements possible under heavy or vibratory loads.	Very rapid permeability.	Very rapid permeability.	Stability variable, depending on stability of shale material; may be permeable.	Generally not needed.	Good water-intake rate; moderate available moisture capacity.	Rapid permeability.	Erodible on stronger slopes.
Variable stability, depending on character of underlying material; variable compressibility; large settlements possible under heavy or vibratory loads.	Seasonally high water table; rapid permeability.	Subject to excess seepage in dry periods.	Good stability and shear strength; slow permeability when compacted.	Seasonally high water table; stratified sands subject to piping.	High water-intake rate; moderate available moisture capacity.	Permeable	Subject to prolonged flow from surrounding areas; erodible if sandy.
Variable stability; variable compressibility.	Seasonally high water table; slow permeability.	Seasonally high water table; slow permeability.	Very poor stability; low shear strength; poor workability when wet; subject to shrinking and swelling.	Seasonally high water table; slow internal water movement; cut slopes may be unstable.	Slow water-intake rate; generally not irrigated.	Poor workability when wet.	Highly erodible.
Variable stability; variable compressibility.	Moderately eroded to severely eroded; heavy clay soils on steep to very steep slopes; slow to very slow permeability.	Seasonally high water table; slow to very slow permeability; steep to very steep slopes.	Very poor stability; low shear strength; poor workability when wet; subject to shrinking and swelling; steep slopes.	Slow to very slow internal water movement; steep to very steep slopes.	Generally not irrigated.	Poor workability when wet; steep to very steep slopes.	Highly erodible; steep to very steep slopes.
Generally unstable; variable compressibility.	Subject to occasional flooding; slow permeability.	Seasonally high water table; slow permeability.	Very poor stability; very low shear strength; slow permeability; subject to shrinking and swelling; poor workability when wet.	Cut slopes very unstable; may contain sand lenses subject to piping; slow internal water movement.	Seasonally high water table; high available moisture capacity.	Nearly level relief.	Nearly level relief.
Stable; steep slopes in places.	Limestone bedrock at depth of 2 to 6 inches.	Limestone bedrock at depth of 2 to 6 inches.	Limestone bedrock at depth of 2 to 6 inches.	Limestone bedrock at depth of 2 to 6 inches.	Limestone bedrock at depth of 2 to 6 inches.	Limestone bedrock at depth of 2 to 6 inches.	Limestone bedrock at depth of 2 to 6 inches.

TABLE 7.—*Interpretations of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Romulus silt loam (Rs).	Fair	Unsuitable	Fair	Highly organic surface layer; prolonged high water table; flat or depressional relief.	Generally unstable subgrade and cut slopes.	Generally adequate strength for moderately high embankments.
Schoharie silt loam (SeB). Schoharie silty clay loam (ShC3, ShD3). Schoharie soils (SlE3).	Poor to fair; may be too clayey.	Unsuitable	Good when dry.	Seasonally high water table. ShD3; steep slopes. SlE3; very steep slopes.	Generally unstable subgrades and cut slopes.	Generally adequate strength for low embankments; moderately high compressibility.
Scio silt loam (SmB).	Generally good.	Good in places below depth of 20 to 30 inches.	Generally good above water table.	Seasonally high water table.	Cut slopes and subgrade unstable below water table.	Generally adequate strength for low embankments.
Sloan silt loam (Sn).	Generally good; wet in natural state.	Unsuitable	Unsuitable	Highly organic surface layer; subject to flooding; prolonged high water table.	Subject to flooding; cut slopes unstable.	Variable strength.
Stafford loamy fine sand (StA).	Fair	Fair for sand; unsuitable for gravel.	Fair; may be wet in natural state; highly erodible.	Seasonally high water table; flat relief.	Cut slopes and subgrade unstable below water table.	Generally adequate strength for low embankments.

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally fair stability; moderate compressibility.	Prolonged high water table; slow permeability; subject to runoff from surrounding areas.	Prolonged high water table; slow permeability.	Fair stability; slow permeability; poor workability when wet.	Cut slopes unstable; slow internal water movement; subject to runoff from surrounding areas.	Prolonged high water table; generally not irrigated.	Flat or depressional areas.	Flat or depressional areas.
Generally unstable; variable compressibility.	Seasonally high water table; slow permeability; subject to runoff from surrounding areas.	Seasonally high water table; slow permeability. ShD3: steep slopes. SlE3: very steep slopes.	Fair to poor stability; slow permeability; poor workability when wet.	Cut slopes unstable; slow internal water movement; subject to runoff from surrounding areas.	Seasonally high water table; generally not irrigated.	Poor workability when wet.	Highly erodible. ShD3: steep slopes. SlE3: very steep slopes.
Variable stability and compressibility, depending on underlying material and water table.	Temporary high water table; variable permeability.	Stratified sands subject to excess seepage in dry periods.	Fair stability; moderate to slow permeability when compacted.	Cut slopes subject to seepage and sloughing; stratified sands subject to piping.	Fair water intake rate; high available moisture capacity.	Sand layers subject to seepage.	Erodible on steeper slopes.
Variable stability and compressibility, depending on underlying material.	Soil consists of stratified sand, silt, and clay deposited in old stream channels; subject to prolonged flooding.	Sand layers subject to excess seepage.	Poor stability; may be permeable.	Subject to prolonged flooding; fine sand subject to piping; natural outlets inadequate.	Subject to prolonged flooding.	Low, nearly level relief.	Low, nearly level relief.
Variable stability and compressibility.	Prolonged high water table; rapid permeability.	Subject to excess seepage in dry periods; high water table.	Fair to poor stability; rapid permeability; highly erodible.	Prolonged high water table; fine sand subject to piping; cut slopes very unstable; natural outlets inadequate in places.	Good water intake rate; moderate to low available moisture capacity; droughty in dry periods; seasonally high water table.	Low, nearly level relief.	Low, nearly level relief.

TABLE 7.—*Interpretation of*

Soil and map symbols	Suitability as source of—			Soil features that affect engineering		
	Topsoil	Granular material (sand and gravel)	Fill material	Highway location	Highway cut slopes	Embankment foundations
Warners loam (Wr).	Fair; limited amount over marl.	Unsuitable	Unsuitable	Layer of loam or silt loam over marl; prolonged high water table.	Cut slopes and subgrade very unstable.	Very low strength; generally wet; high water table; high compressibility; severe settlement conditions.
Wayland silt loam (Wa).	Generally good; may be wet in natural state.	Unsuitable	Generally unsuitable.	Subject to frequent flooding; prolonged high water table.	Drainage outlets inadequate.	Variable strength.

[1] Material is so variable that interpretations were not made.

Of the soils in Genesee County, a larger acreage formed on deep glacial till than on any other geologic deposit. The properties of this till therefore determine the normal criteria for the design and construction of engineering structures involving the use of soil material, either in place or transported. The typical glacial till provides stable subgrades, good embankment foundations, and, with proper treatment, stable cut slopes for highways. Generally, it also furnishes good foundation support for buildings. If properly compacted, material excavated from till deposits, either from highway cuts or from outside borrow areas, may be used to form stable embankments. Some till deposits, however, contain many boulders and coarse fragments, and these present a problem of excavation and placement in embankments. In general, the till south of the Onondaga escarpments occurs in drumlins and on lower till plains.

On the plateau south of the Onondaga limestone, the soils were formed from till derived mainly from shale in areas of irregular topography. Here, many cuts and fills are required in the construction of most highways, and bedrock is encountered in deep excavations.

THIN GLACIAL TILL

This material is similar to deep glacial till, but in most places the depth to bedrock is less than 4 feet. Consequently, even in light grading operations, bedrock generally is encountered in cuts. The content of coarse fragments also may be higher. In some places where the till generally is thin, small areas of deep glacial till occur.

Soils that formed on thin glacial till are the Benson and Manlius soils, as well as the moderately deep variants of the Honeoye, Kendaia, Lima, and Mohawk soils.

GLACIAL OUTWASH

These deposits consist of sorted sand and gravel deposited by meltwater from a glacier. They include outwash terraces, deltas, valley trains, kames, kame moraines, and lake beaches. Rarely is any outwash deposit uniform in texture throughout. A high degree of sorting and stratification ordinarily is evident in deltas and outwash terraces. Kames, kame moraines, and beach ridges may contain excessive fines and may be poorly sorted, and contiguous strata may vary considerably in texture. All outwash may include localized strata and lenses of silt, which impede drainage. In places deltas and other outwash deposits are underlain by fine-grained lacustrine material. If outwash is underlain by less pervious material, intermittent or continuous wetness is likely at the line of contact. Lime cementing may occur in some outwash deposits.

The soils that developed on deposits of glacial outwash are those of the Chenango, Fredon, Halsey, Palmyra, and Phelps series.

Sand and gravel from outwash are suitable for many uses. Because of their utility and relative ease of handling, they generally make excellent material for highway embankments. They may be too permeable, however, for embankments intended to hold water. Side slopes of sandy cuts and fills and ditch inverts require positive erosion control measures. Depending on gradation, soundness, and plasticity, outwash can be used for such purposes as (1) fill material for underwater placement; (2) ordinary fill; (3) material to strengthen unstable subgrade soils; (4) subbase for pavements; (5) wearing surfaces for driveways, parking lots, and some low-class roads; (6) material for highway boulders; (7) free-

engineering properties of soils—Continued

Soil features that affect engineering—Continued							
Building foundations	Infiltration systems	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
		Reservoir areas	Embankments				
Generally unstable; high to very high compressibility.	Thin layer of silty material over marl; located in swampy areas.	Variable permeability.	Very poor stability; highly compressible.	Very high shrinkage when first drained.	Generally not irrigated.	Level relief	Level relief.
Variable stability and compressibility.	Stratified soil material deposited on flood plains by overflowing streams; subject to frequent flooding.	Subject to frequent flooding.	Very unstable	Stratified sands subject to piping; cut slopes unstable; natural outlets inadequate.	Generally not irrigated.	Low, nearly level areas.	Low, nearly level areas.

draining, granular backfill for structures and pipes; (8) outside shells of impounding dams; and (9) abrasives for ice-control on highways.

Some outwash deposits are on extensive flat terraces and deltas, which, if well drained, furnish excellent locations for highways and other developments. Granular material is commonly underlain by wet silt and clay that are soft and weak. This possibility must always be considered on all sites of proposed heavy fills and structures. Kames and kame moraines require considerable grading for highways and other facilities. These steep-sided granular deposits have excellent surface drainage, but silt strata, which retard internal drainage, are to be found within all types of outwash deposits. If these silt strata are intercepted by a highway gradeline or are near the top of the subgrade in cuts, differential frost heaving will occur. For highways and other paved areas, undercutting may be necessary to prevent differential frost heaving and to provide uniform subgrade support. Cuts in these materials may be dry during construction seasons, and it is difficult to foresee the potentially adverse moisture conditions that develop in wet seasons of the year.

In the area underlain by shale bedrock south of the escarpment, most outwash materials are largely particles of soft shale, and these particles weather rapidly when exposed to frost action and to wetting and drying. Normally, outwash is usable for most purposes requiring granular material, but the use of shaly gravel is limited to common fill.

LACUSTRINE SEDIMENTS

Silty and clayey lacustrine deposits generally have a high water table, and wet silt and clay may underlie the surface material. In most places lacustrine sediments are increasingly wet with depth. Brown silt and clay generally occur at the surface where aeration is possible. Gray, wetter material normally underlies the oxidized portion. Infiltration is restricted, and wherever the topography is nearly flat, runoff is slow.

The landform is either a plain or a terrace. In places the terraces have been dissected, and there are steep, unstable terrace fronts. Here, erosion is serious and landslides are common.

Soils formed on silty and clayey lacustrine sediments are the Canandaigua, Collamer, Dunkirk, Lakemont, Madalin, Niagara, Odessa, and Schoharie soils. The Arkport, Colonie, Elnora, Galen, Lamson, Minoa, and Stafford soils formed on sandy lacustrine sediments.

In proportion to their extent, soils formed on lacustrine sediments present more engineering problems than any other soils in the county, except muck. Trafficability on these finer textured soils is poor in spring, as well as during prolonged wet periods throughout the rest of the construction season. Sandy material also may present trafficability problems.

Where sandy sediments occur at the surface, they are commonly underlain by silt and clay. Shoring or dewatering the soil, or both, likely will be necessary in excavations. Cut slopes in lacustrine sediments may slough unless they are covered with a thick blanket of free-draining gravel or are provided with drains that intercept the ground water before it emerges on the slope.

Generally, lacustrine soils are poorly suited for foundations. They may settle considerably under heavy fills and structures. As a rule, bridges and buildings require pile foundations unless the loads are only light to moderate. The subsurface material must be thoroughly investigated

and analyzed to determine strength and settlement characteristics.

In most places the soils formed in lacustrine sediments are stone free and, depending on their texture, are a fair source of topsoil.

ALLUVIAL SEDIMENTS

Alluvial material is deposited wherever streams carrying sediments drop their load. These deposits, which form the flood plain adjacent to streams, vary in texture within short distances. In places the texture of contiguous strata differs appreciably, and there may be little resemblance between material at the surface and that deep in the profile.

Alluvium is subject to periodic flooding. Surface drainage varies, and a water table near the surface is characteristic. In many places the deposits are soft and loose because they have not been compacted. Layers of organic material may occur at the surface or below it.

In Genesee County the soils formed in alluvium are the Eel, Genesee, Holly, Middlebury, Sloan, Warners, and Wayland soils. These alluvial soils are commonly used as sites for bridges and for fills at bridge approaches. Here, loads are heavy on the underlying soils. Because foundation conditions are generally poor in these areas, a thorough subsurface investigation and, in most places, a special analysis and design are required before high embankments and foundations for bridges are constructed.

Soils formed in recent alluvium should be avoided as building sites. Sewage disposal by leaching is always troublesome in these soils because the water table is seasonally or permanently high.

MUCK

These accumulations of plant and animal remains in poorly drained areas are mostly organic matter, but they may contain varying amounts of inorganic material. They lie in swamps and at the surface of other poorly drained depressional areas. Among the muck areas in this county are Oak Orchard Swamp, Bergen Swamp, and other smaller depressions.

Ordinarily, organic soils are entirely unsuitable for highway and other embankment sites because they are highly compressible and unstable. They are generally underlain by soft, wet alluvium, marl, or lacustrine sediments.

BEDROCK

All bedrock in the county furnishes excellent foundations for highway embankments. Bedrock encountered in foundations for dams to store water must be properly sealed to prevent excess seepage. For building foundations, each site should be investigated for structural weakness in the rock, particularly if the proposed structure is one that concentrates a heavy load on a small area. High rock slopes may require special design. Structure and weathering characteristics are the properties that influence stability in cut slopes and govern the design in rock cuts. Benching may be necessary if highway embankments are constructed on steep rock surfaces.

Pavements underlain by rock near the surface are subject to differential frost heaving. Seepage water accumulates and freezes between the pavement and the underlying rock. Seepage should be intercepted by constructing adequate ditches, by blasting rock trenches, or by both. Depressions in the rock surface should be drained or filled with material that is not susceptible to frost action. If the surface of the bedrock is flat, a moderately high gradeline may eliminate the need for blasting rock in ditch excavations.

Soils and engineering construction

Highways, dams, bridges, buildings, drainage installations, and other engineering structures are constructed on or partly of earth material, and the design of such structures should reflect the nature and physical properties of the soils involved. Some features of engineering works are highly dependent on soil properties, such as depth to bedrock, depth to water table, texture, and permeability. Discussed in the following paragraphs are the effects of soil features on engineering structures for soil and water conservation and on building foundations, slope stability, soil compaction, and construction of embankments in winter. Also discussed is the effect of frost action in soils and the use of topsoil.

SOIL AND WATER CONSERVATION WORK

Farm drainage, irrigation, farm ponds, dikes and levees, diversion terraces, and waterways are used to conserve soil and water.

Some of the soils derived from glacial till are underlain by a compact fragipan, or platy substratum, that retards the movement of water. Seepage along the top of this layer causes wet spots, and interception drains of both surface and subsurface types may be required. The installation of irrigation systems in these soils, or in soils that are shallow to bedrock, calls for careful investigation because the depth of tillable soil is limited.

Most of the glacial till soils in the county have impeded permeability and are suitable for farm ponds. Some glacial till soils, however, contain sandy lenses that can cause excess seepage from the reservoir. These sandy lenses may also cause piping and instability in drainage structures.

Soils formed on lacustrine sediments have highly variable engineering properties and require careful investigation for most uses. The clayey lacustrine soils are generally suitable for farm ponds, but in places they contain lenses of sand that may cause piping.

The soils derived from glacial outwash and alluvium are, as a rule, composed of larger particles and are more permeable than the soils derived from glacial till. If farm ponds for storing water above ground are built in these soils, a sealing agent should be used to prevent seepage of water from the reservoir. Ponds that are dug out to store water below the surface have been successful in places where the water table is close to the surface. Layers of poorly graded silt, fine sand, or sand present problems if open ditches or subsurface drains are installed, because these materials are subject to erosion, sloughing, and slumping. Subsurface drainage systems installed in such layers must be protected against plugging with silt and fine sand. The fact that gravelly and sandy outwash soils normally are droughty and have a low water-holding capacity should be considered when planning an irrigation system.

BUILDING FOUNDATIONS

For building foundations, special subsurface investigation and special design are required to fit the structural requirements to the nature and bearing capacity of the soil. A general subsurface investigation may suffice for

residential or very light commercial buildings. Foundations for heavy structures require detailed subsurface exploration, testing, and analysis.

The problem of wet basements can be solved by proper selection of building sites or appropriate use of foundation drains, or both, and by dampproofing or waterproofing.

SLOPE STABILITY

Erosion control is necessary on all cut or fill slopes. If the slopes are stable against sloughing or sliding, the establishment of a vegetative cover helps to control erosion.

The possibility of slope instability caused by inadequate strength of the foundation soil layers can be determined by extensive sampling, laboratory testing, and analysis. To prevent this type of instability, deep subdrainage or flattening or otherwise changing the shape of the slope generally is required.

Another form of slope instability is evidenced by sloughing, ravelling, or gullying. Each case must be considered individually. Erosion by surface water is especially serious on cut or fill slopes of sand or silt and in drainage channels. Surface water above an erodible slope must be collected and safely removed by use of an adequate disposal system.

SOIL COMPACTION

The primary purpose of soil compaction in embankment construction is to provide uniform density, strength, and compressibility. The degree of compaction should be commensurate with the use of the earth embankment. Dense, impervious embankments are required for dams. Pavements, base courses, and the upper portions of highway embankments and parking fields should be well compacted.

CONSTRUCTING EMBANKMENTS IN WINTER

During freezing weather, much greater compactive effort is required to obtain the minimum acceptable degree of compaction of soils. As the temperature falls below 20° to 25° F., it becomes virtually impossible to attain a satisfactory degree of densification with standard compaction equipment, even when working with relatively clean sand and gravel. Highway embankments constructed when the weather is freezing generally settle unevenly for a period of years, and consequently the pavements become rough. Therefore, winter work on construction of embankments should be limited to the placement of rock fills. The surface of partially constructed embankments that is left exposed in winter should be crowned and rolled smooth to shed water and thus prevent infiltration.

In the construction of earth embankments, no fill should be placed on a frozen surface, nor should snow, ice, or frozen material be incorporated in the embankment.

FROST ACTION IN SOILS

All soils in the county are frost susceptible to some degree. The fine-grained or silty soils have the lowest strength when thawing; however, these soils also have correspondingly lower strength than granular soils under normal moisture-density conditions. The granular soils commonly contain silt lenses, which increase the likelihood of differential frost heaving. The design of all roads should provide uniformity of subgrade to minimize differential heaving, and also sufficient thickness of pavement, base, and subbase to support traffic over the subgrade when its bearing capacity is lowest, during the spring thaw.

TOPSOIL

Topsoil, as referred to here and in table 7, is soil material that may be used to cover less fertile or otherwise unsatisfactory soils to facilitate the establishment and maintenance of a plant cover.

Improvement of public areas, industrial parks, athletic fields, and residential developments may require the importation of topsoil for site development and for tree plantings. Topsoil for athletic fields and other places where mowing equipment will be used ought to be free of stones.

In general, stoniness and soil texture are difficult to modify. Removing stones is laborious and expensive, and modifying texture requires the addition of material of different texture. Soils formed from shaly till commonly contain fragments of soft shale, and these may slowly disintegrate when exposed to alternate freezing and thawing. Generally, the Eel, Genesee, and other alluvial soils are the most satisfactory sources of topsoil.

The acidity of topsoil material can be easily changed by liming. Organic matter can be added or cover crops grown and then incorporated. Adding fertilizer increases productivity.

SOIL FEATURES AFFECTING HIGHWAY LOCATION

Highway location may be influenced by many soil features, both as to location on the landscape and selection of the gradeline with respect to the surface.

Soils on sloping till uplands, such as the Ontario soils, and on hilly outwash deposits, such as the steep Palmyra soils, generally involve cuts and fills. As compared with soils on well-drained and flood-free terraces, they involve more earthwork in construction.

Undulating and gully-dissected soils formed in silty and clayey lacustrine sediments, such as the Schoharie soils, also involve cuts and fills. Cuts in these materials may involve the handling of wet materials, and embankment foundations may be unstable. Thus, by comparison, the volume of earthwork in till uplands and hilly outwash may be greater, but the overall expense of construction may be less. In wet seasons, construction is easier on a till landscape than on a lacustrine landscape. Sandy lacustrine or eolian deposits, such as those in which the Colonie and Elnora soils formed, generally present few difficulties, but cuts in these materials may be troublesome because of ground water.

On terraces of granular material (sand and gravel), such as those occupied by the Palmyra soils, highway construction generally is easy and involves relatively light cuts and fills. Good drainage permits uninterrupted grading operations. Even after rainstorms, these areas can be occupied without delay.

The Genesee, Eel, and other alluvial soils are variable. They are subject to overflow and commonly have a relatively high water table. The moderately high gradeline necessary on these soils, in order to avoid roadway flooding and wet subgrades, requires that borrow material be obtained from a source other than adjacent alluvium, because alluvium may be wet and hence unsuitable for use

as embankment material. Unless alluvial deposits are sandy, compacting the subgrade soils is difficult. Unfortunately, the subgrades, unless adequately compacted, will eventually yield enough to cause unevenness in pavements.

The gradeline selected for any highway location is influenced by drainage, soil texture, topography, and, in some places, by other properties of the soils. Areas that are poorly drained and are subject to flooding require a moderately high gradeline. In granular materials, strata having variable permeability may be encountered in cuts. Consequently, subgrades in such cuts are not uniform.

Some soils, such as the Marilla soils, are underlain by a dense fragipan. Where possible, the grade should be planned so that cutting in and out of the pan is not necessary.

In flat areas where the soils, such as the Benson soils, are shallow over bedrock, the grade should be high enough, if possible, so that blasting rock for ditches is not necessary.

Nonfarm Uses of Soils

This subsection gives ratings for the limitations on soils that are used for homesites, streets and parking lots in subdivisions, sanitary land fill, pipeline installations, and other nonfarm uses. Table 8 lists the soils in the county and shows the kinds and estimated degree of limitations that affect their use for various purposes.

The major properties that affect nonfarm uses of soils are slope; the flooding hazard, or the risk of inundation or undermining; the height of the water table during the use period; the texture of the soil in the topmost 10 inches; the texture of the soil below a depth of 10 inches; the presence of hard bedrock, which generally requires blasting before it can be removed; the presence of soft bedrock, which generally can be removed with power tools; soil permeability, or the rate at which water moves through the soil; stoniness, or the content of stones 10 inches or more across; and rockiness, or the occurrence of areas in which bedrock crops out.

TABLE 8.—*Estimated degree and kind of limitations*

[Made land, tillable (Md) and Made land and Dumps (Me)

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
Ad	Alden mucky silt loam	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.
AeA	Allis silty clay loam, deep, 0 to 4 percent slopes.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.
Al	Alluvial land	Severe: subject to frequent flooding; seasonally high water table.	Severe: subject to frequent flooding; seasonally high water table.	Severe: subject to frequent flooding; seasonally high water table.
AnA	Angola silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; ponding in some places; rippable bedrock at depth of 1½ to 3 feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.
AnB	Angola silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.
ApB	Appleton silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.

In table 8 the limitations of the soils in the county are rated slight, moderate, or severe. If the limitations are rated moderate or severe, the chief limitation for the use specified is listed. A rating of *slight* indicates that the soil has few or no limitations and is considered desirable for the use named. A rating of *moderate* shows that a moderate problem is recognized but can be overcome or corrected. A rating of *severe* indicates that use of the soil is seriously limited by a hazard or restriction that is difficult to overcome. A rating of severe for a particular use does not imply that a soil so rated cannot be put to that use. Also, it should be recognized that large-scale cuts or fills in an area may alter the natural soil so much that ratings given in the table no longer apply.

Any one property may not restrict all types of nonfarm uses equally. For example, a seasonally high water table that is a moderate limitation for most uses can severely limit the use of a soil as homesites.

Following are explanations of the uses rated in table 8:

Homesites.—These sites are for homes of three stories or less that have a basement, but the ratings also apply to locations for service buildings in recreational areas. Considered in rating the soils are height of the water table, stability of the soil, depth to hard rock, degree of slope, hazard of flooding, and stoniness or rockiness. The two most common limitations encountered in locating sites for homes are temporary wetness and soil instability, which can result in settling and cracking of walls and floors.

Streets and parking lots in subdivisions.—Soil requirements and limitations for streets and parking lots are similar to those for highways. In rating the soils the main features considered are wetness and height of water table, degree of slope, soil stability, hazard of flooding, depth to hard bedrock, and presence of rock outcrops. (See tables 6 and 7 in the subsection "Engineering Applications." Table 6 gives, for the major horizons of the soils in each series, the range in permeability and other properties. In table 7 are shown, for each soil, a rating as a source of fill material and the soil features that affect highway location.)

for selected nonfarm uses of the soils

are too variable to be rated and are not shown in this table]

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Moderate: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.
Generally slight, but seasonally high water table 0 to 1 foot below surface.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.	Severe: seasonally high water table 0 to 1 foot below surface; depth to rippable bedrock 3 to 5 feet.
Generally moderate: variable stability; seasonally severe because of flooding and seasonally high water table.	Severe: subject to frequent flooding; seasonally high water table.	Severe: subject to frequent flooding; seasonally high water table.	Severe: subject to frequent flooding; seasonally high water table.	Severe: subject to frequent flooding; seasonally high water table.
Generally moderate, but seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; ponding in some places; rippable bedrock at depth of 1½ to 3 feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; rippable bedrock at depth of 1½ to 3 feet.
Generally moderate, but seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; rippable bedrock at depth of 1½ to 3 feet.
Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
ArB	Arkport very fine sandy loam, 1 to 6 percent slopes.	Slight	Slight	Slight
ArC	Arkport very fine sandy loam, 6 to 12 percent slopes.	Slight to moderate: 6 to 12 percent slopes.	Moderate to severe: 6 to 12 percent slopes.	Slight
AsD	Arkport and Dunkirk soils, 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.
AsE	Arkport and Dunkirk soils, 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.
BeB	Benson soils, 0 to 8 percent slopes.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.
BeD	Benson soils, 8 to 25 percent slopes.	Severe: bedrock at depth of 1 foot to 1½ feet; 8 to 25 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.
BeE	Benson soils, 25 to 40 percent slopes.	Severe: bedrock at depth of 1 foot to 1½ feet; 25 to 40 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.
BuA	Burdett silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow to slow permeability.
BuB	Burdett silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow to slow permeability.
CaA	Canandaigua silt loam, 0 to 2 percent slopes.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; moderately slow permeability.
CdA	Canandaigua mucky silt loam, 0 to 2 percent slopes.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; moderately slow permeability.
CeA	Cazenovia silt loam, 0 to 3 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Moderate: stability of very fine sand and silt.	Slight	Slight for tents; slight to moderate for trailers (1 to 6 percent slopes).	Slight	Slight.
Moderate: stability of very fine sand and silt.	Slight to moderate: 6 to 12 percent slopes.	Slight to moderate for tents (6 to 12 percent slopes); moderate to severe for trailers (6 to 12 percent slopes).	Slight to moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.
Moderate: 12 to 20 percent slopes; stability of very fine sand and silt.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.
Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.
Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.	Severe: bedrock at depth of 1 foot to 1½ feet.
Severe: bedrock at depth of 1 foot to 1½ feet; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 8 to 25 percent slopes; many outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 8 to 25 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 8 to 25 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 8 to 25 percent slopes; many outcrops of rock.
Severe: bedrock at depth of 1 foot to 1½ feet; 25 to 40 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 25 to 40 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 25 to 40 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 25 to 40 percent slopes; many rock outcrops.	Severe: bedrock at depth of 1 foot to 1½ feet; 25 to 40 percent slopes; many outcrops of rock.
Generally slight, but seasonally high water table ½ foot to 1½ feet below surface.	Moderate: water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow and slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow and slow permeability.
Generally slight, but seasonally high water table ½ foot to 1½ feet below surface.	Moderate: water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow and slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow and slow permeability; 3 to 8 percent slopes.
Severe: poor stability; prolonged high water table; ponding.	Severe: prolonged high water table 0 to 1 foot below surface; ponding.	Severe: prolonged high water table 0 to 1 foot below surface; ponding; moderately slow permeability.	Severe: prolonged high water table 0 to 1 foot below surface; ponding.	Severe: prolonged high water table 0 to 1 foot below surface; ponding.
Severe: poor stability; prolonged high water table; ponding.	Severe: prolonged high water table 0 to 1 foot below surface; ponding; mucky surface layer.	Severe: prolonged high water table 0 to 1 foot below surface; ponding; moderately slow permeability; mucky surface layer.	Severe: prolonged high water table 0 to 1 foot below surface; ponding; mucky surface layer.	Severe: prolonged high water table 0 to 1 foot below surface; ponding; mucky surface layer.
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
CeB	Cazenovia silt loam, 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.
CeC	Cazenovia silt loam, 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability; 8 to 15 percent slopes.
CgC3	Cazenovia silty clay loam, 8 to 15 percent slopes, eroded.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability; 8 to 15 percent slopes, eroded.
CgD3	Cazenovia silty clay loam, 15 to 25 percent slopes, eroded.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
ChA	Chenango shaly silt loam, 0 to 3 percent slopes.	Slight	Slight	Slight
ChB	Chenango shaly silt loam, 3 to 8 percent slopes.	Slight	Moderate: 3 to 8 percent slopes.	Slight
ChC	Chenango shaly silt loam, 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.
ClB	Collamer silt loam, 2 to 6 percent slopes.	Moderate: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface; 2 to 6 percent slopes.	Moderate: seasonally high water table 1½ to 2 feet below surface; moderately slow permeability.
CmB	Colonie loamy fine sand, 2 to 6 percent slopes.	Slight	Moderate: 2 to 6 percent slopes.	Slight
CmC	Colonie loamy fine sand, 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.
CoA	Conesus silt loam, 0 to 3 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.
CoB	Conesus silt loam, 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.
CoC	Conesus silt loam, 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability; 8 to 15 percent slopes.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability; 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (seasonally high water table, moderately slow permeability); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (seasonally high water table, moderately slow permeability); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Slight	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Slight	Slight	Slight	Slight	Slight.
Slight	Slight	Slight for tents; moderate for trailers (3 to 8 percent slopes).	Slight	Moderate: 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Moderate: stability of very fine sand and silt.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; moderately slow permeability.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; moderately slow permeability; 2 to 6 percent slopes.
Moderate: stability of loamy fine sand.	Moderate: droughty	Slight for tents; moderate for trailers (2 to 6 percent slopes).	Moderate: loamy fine sand texture.	Moderate: loamy fine sand texture; 2 to 6 percent slopes.
Moderate: stability of loamy fine sand.	Moderate: 6 to 12 percent slopes; droughty.	Moderate for tents; severe for trailers; 6 to 12 percent slopes; loamy fine sand texture.	Moderate: loamy fine sand texture; 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.
Slight	Slight	Moderate: seasonally high water table 1½ to to 2½ feet below surface; moderately slow permeability.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; slow permeability.
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability; 3 to 8 percent slopes.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; slow permeability; 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (seasonally high water table, moderately slow permeability, 8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
DaA	Darien silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.
DaB	Darien silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.
DaC	Darien silt loam, 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 15 percent slopes.
DaD	Darien silt loam, 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 15 to 25 percent slopes.
DuB	Dunkirk silt loam, 2 to 6 percent slopes.	Moderate: seasonally high water table at depth of 2 feet.	Moderate: seasonally high water table 2 feet below surface; 2 to 6 percent slopes.	Moderate: seasonally high water table 2 feet below surface; moderately slow permeability.
DuC	Dunkirk silt loam, 6 to 12 percent slopes.	Moderate: seasonally high water table at depth of 2 feet; 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: seasonally high water table 2 feet below surface; moderately slow permeability; 6 to 12 percent slopes.
Ed	Edwards muck	Severe: prolonged high water table at surface; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; mucky soil material.
Ee	Eel silt loam	Severe: frequent flooding; seasonally high water table 1½ to 2½ feet below surface.	Severe: frequent flooding; seasonally high water table 1½ to 2½ feet below surface.	Severe: frequent flooding; seasonally high water table 1½ to 2½ feet below surface.
ElB	Elnora loamy fine sand, 2 to 6 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 2 to 6 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.
Fo	Fonda mucky silt loam	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; slow permeability.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Slight	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.
Slight	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability; 3 to 8 percent slopes.
Slight	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability; 8 to 15 percent slopes.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability; 8 to 15 percent slopes.
Slight	Severe: 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability; 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability; 15 to 25 percent slopes.
Slight	Slight	Moderate: seasonally high water table 2 feet below surface; moderately slow permeability.	Slight	Moderate: depth to seasonally high water table 2 feet; 2 to 6 percent slopes.
Slight	Moderate: 6 to 12 percent slopes.	Moderate for tents (seasonally high water table, moderately slow permeability, 6 to 12 percent slopes); severe for trailers (6 to 12 percent slopes).	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.
Severe: prolonged high water table.	Severe: prolonged high water table at surface; muck unstable.	Severe: prolonged high water table at surface; muck unstable.	Severe: prolonged high water table at surface; muck unstable.	Severe: prolonged high water table; muck unstable.
Generally moderate, but seasonally severe because of flooding and seasonally high water table 1½ to 2½ feet below surface; unstable silt loam.	Moderate: occasional flooding during use period.	Severe: frequent flooding.	Moderate: occasional flooding during use period.	Moderate: occasional flooding during use period.
Generally moderate: unstable loamy fine sand and sand; seasonally severe because of high water table 1½ to 2½ feet below surface.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; loamy fine sand unstable for vehicular traffic.	Moderate: loamy fine sand texture in relation to heavy foot traffic.	Moderate: seasonally high water table 1½ to 2½ feet below surface; loamy fine sand texture in relation to heavy foot traffic.
Severe: unstable; prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; mucky surface layer unstable.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; mucky surface layer unstable.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; mucky surface layer unstable.	Severe: prolonged high water table 0 to 1 foot below surface; ponding in some places; mucky surface layer unstable.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
FrA	Fremont silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability.
FrB	Fremont silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface; 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability.
FrC	Fremont silt loam, 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability; 8 to 15 percent slopes.
Fw	Fresh water marsh	Severe: permanently high water table.	Severe: permanently high water table.	Severe: permanently high water table.
GmA	Galen and Minoa very fine sandy loams, 0 to 2 percent slopes:			
	Galen very fine sandy loam	Moderate: seasonally high water table 1 foot to 2 feet below surface.	Moderate: seasonally high water table 1 foot to 2 feet below surface.	Moderate: seasonally high water table 1 foot to 2 feet below surface.
	Minoa very fine sandy loam	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
GnB	Galen very fine sandy loam, 2 to 6 percent slopes.	Moderate: seasonally high water table 1 foot to 2 feet below surface.	Moderate: seasonally high water table 1 foot to 2 feet below surface; 2 to 6 percent slopes.	Moderate: seasonally high water table 1 foot to 2 feet below surface.
Gs	Genesee silt loam	Severe: frequency of flooding.	Severe: frequency of flooding.	Severe: frequency of flooding.
HaA	Halsey silt loam, 0 to 4 percent slopes.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.
HlA	Hilton loam, 0 to 3 percent slopes	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.
HlB	Hilton loam, 3 to 8 percent slopes	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.
Hm	Holly silt loam	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Generally slight, but seasonally severe because of seasonally high water table ½ foot to 1¼ feet below surface, and poor stability.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability.
Slight: generally slight, but seasonally severe because of seasonally high water table ½ foot to 1¼ feet below surface, and poor stability.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability.
Slight: generally slight, but seasonally severe because of seasonally high water table ½ foot to 1¼ feet below surface, and poor stability.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability; 8 to 15 percent slopes.	Moderate: seasonally high water table ½ foot to 1¼ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1¼ feet below surface; slow permeability; 8 to 15 percent slopes.
Severe: permanently high water table.	Severe: permanently high water table.	Severe: permanently high water table.	Severe: permanently high water table.	Severe: permanently high water table.
Severe: poor stability of silt and fine sand; seasonally high water table.	Slight	Moderate: seasonally high water table 1 foot to 2 feet below surface.	Slight	Moderate: seasonally high water table 1 foot to 2 feet below surface.
Severe: poor stability of silt and fine sand; seasonally high water table.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Severe: poor stability of silt and fine sand; seasonally high water table.	Slight	Moderate: seasonally high water table 1 foot to 2 feet below surface; 2 to 6 percent slopes.	Slight	Moderate: seasonally high water table 1 foot to 2 feet below surface; 2 to 6 percent slopes.
Generally slight, but seasonally severe because of flooding and poor stability.	Moderate: frequency of flooding.	Severe: frequency of flooding.	Moderate: frequency of flooding.	Moderate: frequency of flooding.
Generally slight, but seasonally severe because of prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability.	Slight	Moderate: moderately slow permeability.
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; moderately slow permeability; 3 to 8 percent slopes.	Slight	Moderate: moderately slow permeability; 3 to 8 percent slopes.
Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface; poor stability.	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.	Severe: frequency of flooding; prolonged high water table 0 to 1 foot below surface.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
HnB	Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes.	Severe: hard bedrock at depth of 1½ to 3½ feet.	Severe: hard bedrock at depth of 1½ to 3½ feet; 2 to 8 percent slopes.	Severe: hard bedrock at depth of 1½ to 3½ feet.
HoB3	Hornell silty clay loam, 3 to 8 percent slopes, eroded.	Severe: seasonally high water table 1 foot to 2 feet below surface.	Moderate: seasonally high water table 1 foot to 2 feet below surface; rippable bedrock at depth of 1½ to 3½ feet; 3 to 8 percent slopes.	Severe: seasonally high water table; slow permeability; rippable bedrock at depth of 1½ to 3½ feet.
HoC3	Hornell silty clay loam, 8 to 15 percent slopes, eroded.	Moderate: seasonally high water table 1½ to 2 feet below surface; rippable bedrock at depth of 1½ to 3½ feet; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Severe: slow permeability; rippable bedrock at depth of 1½ to 3½ feet.
HsD3	Hornell and Fremont soils, 15 to 25 percent slopes, eroded.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: slow permeability; rippable bedrock at depth of 1½ to 3½ feet; 15 to 25 percent slopes.
IoA	Ilion silt loam, 0 to 3 percent slopes.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table.	Severe: prolonged high water table; slow permeability.
IoB	Ilion silt loam, 3 to 8 percent slopes.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table.	Severe: prolonged high water table; slow permeability.
KeA	Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes.	Severe: water table at depth of ½ foot to 1½ feet; bedrock at depth of 1½ to 3½ feet.	Moderate: water table at depth of ½ foot to 1½ feet; bedrock at depth of 1½ to 3½ feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface; bedrock at depth of 1½ to 3½ feet.
La	Lakemont silty clay loam	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability; poor workability.
Ld	Lamson very fine sandy loam	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.
Le	Lamson mucky very fine sandy loam.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface; mucky surface layer.
LgB	Lansing silt loam, 3 to 8 percent slopes.	Slight	Moderate: 3 to 8 percent slopes.	Slight
LgC	Lansing silt loam, 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Severe: hard bedrock at depth of 1½ to 3½ feet.	Moderate: hard bedrock at depth of 1½ to 3½ feet.	Slight for tents; moderate for trailers (2 to 8 percent slopes).	Moderate: hard bedrock at depth of 1½ to 3½ feet.	Severe: hard bedrock at depth of 1½ to 3½ feet; 2 to 8 percent slopes.
Moderate: seasonally high water table 1 foot to 2 feet below surface; rippable bedrock at depth of 1½ to 3½ feet.	Moderate: seasonally high water table 1 foot to 2 feet below surface; silty clay loam surface layer.	Severe: slow permeability; poor trafficability; silty clay loam texture.	Moderate: seasonally high water table 1 foot to 2 feet below surface; poor trafficability.	Severe: seasonally high water table 1 foot to 2 feet below surface; slow permeability; 3 to 8 percent slopes; silty clay loam texture.
Moderate: seasonally high water table 1 foot to 2 feet below surface; rippable bedrock at depth of 1½ to 3½ feet.	Moderate: seasonally high water table 1 foot to 2 feet below surface; silty clay loam surface layer; 8 to 15 percent slopes.	Severe: slow permeability; poor trafficability; silty clay loam texture; 8 to 15 percent slopes.	Moderate: poor trafficability; 8 to 15 percent slopes.	Severe: slow permeability; 8 to 15 percent slopes; silty clay loam texture.
Moderate: seasonally high water table 1 foot to 2 feet below surface; rippable bedrock at depth of 1½ to 3½ feet.	Severe: 15 to 25 percent slopes.	Severe: slow permeability; poor trafficability; silty clay loam texture; 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes; slow permeability; poor trafficability.
Generally slight, but seasonally severe because of prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table; slow permeability.
Generally slight, but seasonally severe because of prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table; slow permeability; 3 to 8 percent slopes.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; rippable bedrock at depth of 1½ to 3½ feet.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Severe: prolonged high water table; poor stability.	Severe: prolonged high water table 0 to 1 foot below surface; poor trafficability.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability; poor trafficability.	Severe: prolonged high water table 0 to 1 foot below surface; poor trafficability.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability; poor trafficability.
Severe: prolonged high water table 0 to ½ foot below surface; poor stability of sandy substratum.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.
Severe: prolonged high water table 0 to ½ foot below surface; poor stability of sandy substratum.	Severe: prolonged high water table 0 to ½ foot below surface; poor trafficability.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.
Slight	Slight	Slight for tents; moderate for trailers (3 to 8 percent slopes).	Slight	Moderate: 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
LgD	Lansing silt loam, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
LmA	Lima silt loam, 0 to 3 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface.
LmB	Lima silt loam, 3 to 8 percent slopes.	Moderate: seasonally high high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.
LnA	Lima silt loam, moderately deep variant, 0 to 3 percent slopes.	Severe: hard bedrock at depth of 1½ to 3 feet; seasonally high water table 1½ to 2½ feet below surface.	Severe: hard bedrock at depth of 1½ to 3 feet; seasonally high water table 1½ to 2½ feet below surface.	Severe: hard bedrock at depth of 1½ to 3 feet; seasonally high water table 1½ to 2½ feet below surface.
LnB	Lima silt loam, moderately deep variant, 3 to 8 percent slopes.	Severe: hard bedrock at depth of 1½ to 3 feet; seasonally high water table 1½ to 2½ feet below surface.	Severe: hard bedrock at depth of 1½ to 3 feet; seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Severe: hard bedrock at depth of 1½ to 3 feet; seasonally high water table 1½ to 2½ feet below surface.
LoA	Lyons and Appleton silt loams, 0 to 3 percent slopes:			
	Lyons silt loam	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.
	Appleton silt loam	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.
LpA	Lyons and Kendaia silt loams, 0 to 3 percent slopes:			
	Lyons silt loam	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.
	Kendaia silt loam	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Ma	Madalin silty clay loam	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface.	Severe: prolonged high water table 0 to ½ foot below surface; slow permeability; poor workability.
MhA	Manheim silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
MhB	Manheim silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2 feet below surface.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Slight	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface.
Slight	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Slight	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.
Severe: depth to hard bedrock 1½ to 3 feet.	Moderate: hard bedrock at depth of 1½ to 3 feet.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: hard bedrock at depth of 1½ to 3 feet.	Severe: hard bedrock at depth of 1½ to 3 feet.
Severe: depth to hard bedrock 1½ to 3 feet.	Moderate: hard bedrock at depth of 1½ to 3 feet.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Moderate: hard bedrock at depth of 1½ to 3 feet.	Severe: hard bedrock at depth of 1½ to 3 feet; 3 to 8 percent slopes.
Generally slight, but seasonally severe because of prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.
Generally slight, but seasonally severe because of prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Severe: prolonged high water table; unstable.	Severe: prolonged high water table 0 to ½ foot below surface; poor trafficability.	Severe: prolonged high water table 0 to ½ foot below surface; slow permeability; poor trafficability.	Severe: prolonged high water table 0 to ½ foot below surface; poor trafficability.	Severe: prolonged high water table 0 to ½ foot below surface; slow permeability; poor trafficability.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Generally slight, but seasonally severe because of high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; 3 to 8 percent slopes.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; 3 to 8 percent slopes.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
MlB	Manlius very shaly silt loam, 3 to 8 percent slopes.	Moderate: seasonally high water table 2 to 3 feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Moderate: seasonally high water table 2 to 3 feet below surface; rippable bedrock at depth of 1½ to 3 feet.	Moderate: seasonally high water table; rippable bedrock at depth of 1½ to 3 feet.
MlC	Manlius very shaly silt loam, 8 to 15 percent slopes.	Moderate: seasonally high water table 2 to 3 feet below surface; rippable bedrock at depth of 1½ to 3 feet; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table; rippable bedrock at depth of 1½ to 3 feet; 8 to 15 percent slopes.
MlD	Manlius very shaly silt loam, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
MlE	Manlius very shaly silt loam, 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.
MmA	Marilla shaly silt loam, 0 to 3 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Severe: slow permeability; seasonally high water table 1½ to 2½ feet below surface.
MmB	Marilla shaly silt loam, 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 3 to 8 percent slopes.	Severe: slow permeability; seasonally high water table 1½ to 2½ feet below surface.
MmC	Marilla shaly silt loam, 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 2½ feet below surface; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Severe: slow permeability; seasonally high water table 1½ to 2½ feet below surface.
Mn	Middlebury silt loam	Servere: subject to flooding; seasonally high water table 1½ to 2 feet below surface.	Severe: subject to flooding; seasonally high water table 1½ to 2 feet below surface.	Severe: subject to flooding; seasonally high water table 1½ to 2 feet below surface.
MoB	Mohawk silt loam, 2 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface.	Moderate: seasonally high water table 1½ to 3 feet below surface; 2 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface.
MoC	Mohawk silt loam, 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; 8 to 15 percent slopes.
MoD	Mohawk silt loam, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
MpB	Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; rippable bedrock at depth of 1½ to 3½ feet.	Moderate: seasonally high water table 1½ to 3 feet below surface; 2 to 8 percent slopes; rippable bedrock at depth of 1½ to 3½ feet.	Moderate: seasonally high water table 1½ to 3 feet below surface; rippable bedrock at depth of 1½ to 3½ feet.
MpC	Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; rippable bedrock at depth of 1½ to 3½ feet; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; rippable bedrock at depth of 1½ to 3½ feet.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Moderate: rippable bedrock at depth of 1½ to 3 feet.	Moderate: rippable bedrock at depth of ½ foot to 3 feet.	Moderate: seasonally high water table 2 to 3 feet below surface; 3 to 8 percent slopes.	Moderate: very shaly surface layer.	Severe: seasonally high water table 2 to 3 feet below surface; rippable bedrock at depth of 1½ to 3 feet; 3 to 8 percent slopes.
Moderate: rippable bedrock at depth of 1½ to 3 feet.	Moderate: rippable bedrock at depth of ½ foot to 3 feet; 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: very shaly surface layer; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Moderate: rippable bedrock at depth of 1½ to 3 feet.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.
Slight	Slight	Severe: slow permeability.	Slight	Severe: slow permeability.
Slight	Slight	Severe: slow permeability.	Slight	Severe: slow permeability; 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Generally moderate: stability of silty soil material; seasonally severe because of flooding and seasonally high water table 1½ to 2 feet below surface.	Moderate: occasional flooding during use period.	Severe: occasional flooding during use period.	Moderate: occasional flooding during use period.	Moderate: occasional flooding during use period.
Slight	Slight	Moderate: seasonally high water table 1½ to 3 feet below surface; 2 to 8 percent slopes.	Slight	Moderate: seasonally high water table 1½ to 3 feet below surface; 2 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Slight	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Moderate: rippable bedrock at depth of 1½ to 3½ feet.	Moderate: rippable bedrock at depth of 1½ to 3½ feet.	Moderate: seasonally high water table 1½ to 3 feet below surface; 2 to 8 percent slopes.	Slight	Moderate: seasonally high water table 1½ to 3 feet below surface; 2 to 8 percent slopes; rippable bedrock at depth of 1½ to 3 feet.
Moderate: rippable bedrock at depth of 1½ to 3½ feet.	Moderate: rippable bedrock at depth of 1½ to 3½ feet; 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
MpD	Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Mr	Muck, deep	Severe: prolonged high water table at surface.	Severe: prolonged high water table at surface.	Severe: prolonged high water table at surface; muck unsuitable as fill.
Ms	Muck, shallow	Severe: prolonged high water table at surface.	Severe: prolonged high water table at surface.	Severe: prolonged high water table at surface; muck unsuitable as fill.
NaA	Niagara and Collamer silt loams, 0 to 2 percent slopes:			
	Niagara silt loam	Severe: seasonally high water table ½ to 1 foot below surface.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow to moderate permeability.
	Collamer silt loam	Moderate: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface; moderately slow permeability.
NuB	Nunda silt loam, 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface.	Moderate: seasonally high water table 1½ to 3 feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; moderately slow permeability.
NuC	Nunda silt loam, 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface; moderately slow permeability; 8 to 15 percent slopes.
NuD	Nunda silt loam, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
OdA	Odessa silt loam, 0 to 2 percent slopes.	Severe: seasonally high water table ½ to 1 foot below surface.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table; slow permeability.
OdB	Odessa silt loam, 2 to 6 percent slopes.	Severe: seasonally high water table ½ to 1 foot below surface.	Severe: 2 to 6 percent slopes.	Severe: seasonally high water table; slow permeability.
OnA	Ontario loam, 0 to 3 percent slopes.	Slight	Slight	Moderate: moderately slow to moderate permeability.
OnB	Ontario loam, 3 to 8 percent slopes.	Slight	Moderate: 3 to 8 percent slopes.	Moderate: moderately slow to moderate permeability.
OnC	Ontario loam, 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: moderately slow to moderate permeability; 8 to 15 percent slopes.
OnD	Ontario loam, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Moderate: rippable bedrock at depth of 1½ to 3½ feet.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table; instability of muck.
Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table at surface; instability of muck.	Severe: prolonged high water table; instability of muck.
Severe: stability of silt and very fine sand; seasonally high water table ½ to 1 foot below surface.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow to moderate permeability.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow to moderate permeability.
Severe: stability of silt and very fine sand; seasonally high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; moderately slow permeability.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; moderately slow permeability.
Slight	Slight	Moderate: seasonally high water table 1½ to 3 feet below surface; moderately slow permeability; 3 to 8 percent slopes.	Slight	Moderate: seasonally high water table 1½ to 3 feet below surface; moderately slow permeability; 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Slight	Severe: 15 to 25 percent slopes.	Severe; 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
Severe: poor stability in subsoil and substratum; seasonally high water table ½ to 1 foot below surface.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow permeability.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow permeability.
Severe: poor stability in subsoil and substratum; seasonally high water table ½ to 1 foot below surface.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow permeability.	Moderate: seasonally high water table ½ to 1 foot below surface.	Severe: seasonally high water table ½ to 1 foot below surface; slow permeability.
Slight	Slight	Moderate: moderately slow to moderate permeability.	Slight	Moderate: moderately slow to moderate permeability.
Slight	Slight	Moderate: moderately slow to moderate permeability; 3 to 8 percent slopes.	Slight	Moderate: moderately slow to moderate permeability; 3 to 8 percent slopes.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.
Slight	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
OrE	Ontario and Lansing soils, 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.
OsB	Ontario stony loam, 2 to 8 percent slopes.	Moderate: stoniness	Moderate: 2 to 8 percent slopes.	Severe: stoniness of subsoil and substratum.
OsC	Ontario stony loam, 8 to 15 percent slopes.	Moderate: stoniness; 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Severe: stoniness of subsoil and substratum.
OvA	Ovid silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.
OvB	Ovid silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.
PaA	Palmyra gravelly loam, 0 to 3 percent slopes.	Slight	Slight	Slight
PaB	Palmyra gravelly loam, 3 to 8 percent slopes.	Slight	Moderate: 3 to 8 percent slopes.	Slight
PaC	Palmyra gravelly loam, 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.
PkD	Palmyra and Arkport soils, 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.
PkE	Palmyra and Arkport soils, 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.
PlA	Palmyra shaly silt loam, 0 to 3 percent slopes.	Slight	Slight	Slight
PlB	Palmyra shaly silt loam, 3 to 8 percent slopes.	Slight	Moderate: 3 to 8 percent slopes.	Slight
PlC	Palmyra shaly silt loam, 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.	Severe: 8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.
Severe: stoniness of subsoil and substratum.	Severe: stoniness	Moderate: moderately slow to moderate permeability; 2 to 8 percent slopes.	Slight	Severe: stoniness.
Severe: stoniness of subsoil and substratum.	Severe: stoniness	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: stoniness; 8 to 15 percent slopes.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; moderately slow permeability; 3 to 8 percent slopes.
Slight	Slight	Slight	Slight	Severe: content of gravel and cobblestones more than 35 percent.
Slight	Slight	Slight for tents; moderate for trailers (3 to 8 percent slopes).	Slight	Severe: content of gravel and cobblestones more than 35 percent.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes.	Moderate: 8 to 15 percent slopes.	Severe: content of gravel and cobblestones more than 35 percent; 8 to 15 percent slopes.
Slight for Palmyra soil; moderate for Arkport soil (stability of very fine sand and fine sand).	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: content of gravel and cobblestones more than 35 percent; 15 to 25 percent slopes.
Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: content of gravel and cobblestones more than 35 percent; 25 to 40 percent slopes.
Slight	Slight	Slight	Slight	Severe: content of shale fragments and gravel more than 35 percent.
Slight	Slight	Slight for tents; moderate for trailers (3 to 8 percent slopes).	Slight	Severe: content of shale fragments and gravel more than 35 percent.
Slight	Moderate: 8 to 15 percent slopes.	Moderate for tents (8 to 15 percent slopes); severe for trailers (8 to 15 percent slopes).	Moderate: 8 to 15 percent slopes.	Severe: content of shale fragments and gravel more than 35 percent; 8 to 15 percent slopes.

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TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
PrA	Phelps and Fredon gravelly loams, 0 to 3 percent slopes:			
	Fredon gravelly loam	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
	Phelps gravelly loam	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
PsB	Phelps gravelly loam, 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface; 3 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2 feet below surface.
ReA	Remsen silt loam, 0 to 3 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
ReB	Remsen silt loam, 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
ReC	Remsen silt loam, 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Severe: 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
RmB3	Remsen silty clay loam, 3 to 8 percent slopes, eroded.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 3 to 8 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
RmC3	Remsen silty clay loam, 8 to 15 percent slopes, eroded.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Severe: 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
RmC4	Remsen silty clay loam, 8 to 25 percent slopes, severely eroded.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Severe: 8 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability; 15 to 25 percent slopes.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; gravelly surface layer.
Generally slight, but seasonally severe because of high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; gravelly surface layer.
Generally slight, but seasonally severe because of high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface; 3 to 8 percent slopes.	Slight	Severe: gravelly surface layer; 3 to 8 percent slopes.
Generally moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.
Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.
Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 15 percent slopes.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 15 percent slopes.
Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability; poor workability.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor trafficability; 3 to 8 percent slopes.
Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability; poor workability; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 15 percent slopes.	Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability; 8 to 15 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 15 percent slopes.
Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Severe: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability; poor workability; 8 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability; 8 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 8 to 25 percent slopes.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
RmD3	Remsen silty clay loam, 15 to 25 percent slopes, eroded.	Severe: seasonally high water table ½ foot to 1½ feet below surface; 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
RnE	Remsen soils, 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability; 25 to 40 percent slopes.
RnE4	Remsen soils, 25 to 40 percent slopes, severely eroded.	Severe: seasonally high water table ½ foot to 1½ feet below surface; 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; poor workability.
Ro	Rhinebeck silt loam	Severe: seasonally high water table 0 to 1½ feet below surface.	Moderate: seasonally high water table 0 to 1½ feet below surface.	Severe: seasonally high water table 0 to 1½ feet below surface; slow permeability.
Rr	Rockland, limestone	Severe: many outcrops of hard rock or very shallow soil material.	Severe: many outcrops of hard rock or very shallow soil material.	Severe: many outcrops of hard bedrock or very shallow soil material.
Rs	Romulus silt loam	Severe: seasonally high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.
SeB	Schoharie silt loam, 1 to 6 percent slopes.	Moderate: seasonally high water table 1½ to 3 feet below surface.	Moderate: seasonally high water table 1½ to 3 feet below surface; 1 to 6 percent slopes.	Severe: slow permeability; seasonally high water table 1½ to 3 feet below surface; poor workability in subsoil and substratum.
ShC3	Schoharie silty clay loam, 6 to 12 percent slopes, eroded.	Moderate: seasonally high water table 1½ to 3 feet below surface.	Severe: 6 to 12 percent slopes.	Severe: slow permeability; seasonally high water table 1½ to 3 feet below surface; poor workability in subsoil and substratum.
ShD3	Schoharie silty clay loam, 12 to 20 percent slopes, eroded.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: slow permeability; seasonally high water table 1½ to 3 feet below surface; poor workability in subsoil and substratum; 12 to 20 percent slopes.
SlE3	Schoharie soils, 20 to 40 percent slopes, eroded.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.
SmB	Scio silt loam, 2 to 8 percent slopes.	Moderate: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface.	Moderate: seasonally high water table 1½ to 2 feet below surface.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Moderate: seasonally high water table ½ foot to 1½ feet below surface; poor trafficability when wet; seasonally severe because of wetness.	Severe: 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 15 to 25 percent slopes.	Severe: 15 to 25 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 15 to 25 percent slopes.
Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 25 to 40 percent slopes.
Severe: 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 25 to 40 percent slopes.	Severe: 25 to 40 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface; slow permeability; 25 to 40 percent slopes.
Severe: seasonally high water table 0 to 1½ feet below surface; poor stability of clay and silt in substratum.	Moderate: seasonally high water table 0 to 1½ feet below surface.	Severe: seasonally high water table 0 to 1½ feet below surface; slow permeability.	Moderate: seasonally high water table 0 to 1½ feet below surface.	Severe: seasonally high water table 0 to 1½ feet below surface; slow permeability.
Severe: many outcrops of hard bedrock or very shallow soil material.	Severe: many outcrops of hard bedrock or very shallow soil material.	Severe: many outcrops of hard bedrock or very shallow soil material.	Severe: many outcrops of hard bedrock or very shallow soil material.	Severe: many outcrops of hard bedrock or very shallow soil material.
Severe: prolonged high water table.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.	Severe: prolonged high water table 0 to 1 foot below surface.	Severe: prolonged high water table 0 to 1 foot below surface; slow permeability.
Generally moderate: poor stability in subso and substratum; seasonally severe because of high water table 1½ to 3 feet below surface.	Slight	Severe: slow permeability.	Slight	Severe: slow permeability.
Generally moderate: poor stability in subsoil and substratum; seasonally severe because of high water table 1½ to 3 feet below surface.	Moderate: 6 to 12 percent slopes; poor trafficability and poor workability of surface layer.	Severe: slow permeability; poor trafficability; 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes; poor trafficability.	Severe: slow permeability; 6 to 12 percent slopes.
Moderate: poor stability in subsoil and substratum; seasonally severe because of high water table 1½ to 3 feet below surface.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.
Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.	Severe: 20 to 40 percent slopes.
Severe: stability of very fine sand and silt in cuts.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonally high water table 1½ to 2 feet below surface.

TABLE 8.—*Estimated degree and kind of limitations*

Map symbol	Soil	Homesites	Streets and parking lots in subdivisions	Sanitary land fill
Sn	Sloan silt loam	Severe: prolonged high water table 0 to 1 foot below surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.
StA	Stafford loamy fine sand, 0 to 2 percent slopes.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Wa	Wayland silt loam	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.
Wr	Warners loam	Severe: prolonged high water table at surface.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.

Sanitary land fill.—Among the features that affect the use of soils for sanitary land fill are wetness, slope, stoniness, rockiness at the surface, depth to bedrock, permeability, texture of the surface layer, and the risk of flooding. The most favorable soils for this use are those that are deep, nearly level or gently sloping, and well drained. These include the Arkport, Colonie, Lansing, Ontario, and Palmyra soils. Shallow and moderately deep soils, such as the Benson and Manlius, as well as the moderately deep soils in the Honeoye, Kendaia, and Mohawk series, are limited in use because of depth. Limitations on the use of moderately well drained soils are moderate and on more poorly drained soils are severe. In areas where the slope exceeds 15 percent, restrictions are severe because grading and other operations are so difficult. Stony soils are undesirable, for the many stones and boulders hinder grading. Soils on flood plains have severe limitations because refuse is likely to seep laterally and to contaminate nearby streams.

Pipeline installations.—The choice of a soil suitable for the installation of an underground pipeline is determined mainly by the depth to hard bedrock, slope, content of large stones and boulders, rockiness, and soil stability. Limitations are severe on the shallow Benson soils, which occur near extensive areas in which limestone bedrock is covered by only a thin layer of soil material. In addition, the use of Honeoye, Kendaia, and Lima soils is severely limited because all of these soils are only 20 to 40 inches deep over hard bedrock. On the moderately deep Mohawk and Manlius soils, the limitations are moderate.

Installing pipelines is severely limited on the moderately sloping or strongly sloping Arkport, Dunkirk, and Palmyra soils, all of which have slopes that are somewhat irregular. Also, the Arkport and Dunkirk soils are moderately unstable. Ontario stony loams are the only soils in the county that contain so many large stones and boulders in the subsoil that excavation is severely limited.

Lawns, landscaping, and golf fairways.—Among the soil properties that determine the suitability of soils for lawns, landscaping, and golf fairways are natural drainage, degree of slope, depth to bedrock, texture of the surface layer, stoniness or rockiness, and hazard of flooding. If possible, fairways should be located on soils that are deep, well drained or moderately well drained, and no more than moderately sloping. Areas that are moderately wet can be drained by use of tile.

Campsites.—These areas are used as sites for tents or trailers. The features that can limit use are slope, texture of the surface layer, natural drainage, permeability, frequency of flooding, and stoniness. The most suitable soils are those that are well drained or moderately well drained and nearly level or gently sloping. Among the favorable soils are the Palmyra, Lansing, and Ontario soils having slopes of less than 8 percent. Moderately well drained soils, such as the Phelps, Conesus, and Hilton, are acceptable if they do not lie in depressional areas where ponding occurs. Covering their surface with a thin layer of gravelly material will prevent stickiness during wet periods. The Schoharie and Remsen soils have severe limitations because they are clayey and slowly permeable. These soils are very sticky when wet, and they require a thick covering of gravel to make them usable. Stoniness is a severe limitation in only a few areas in the county.

Play areas and picnic areas (extensive use).—The natural beauty of the landscape is important in considering areas for hiking, picnicking, and similar kinds of recreation. These areas are left essentially in their natural state. The main features that affect use of soils for play areas and picnic areas are height of the water table during the period of heavy use, rockiness and stoniness, slope, texture of the surface layer, and the flooding hazard. Wetness is the major limitation in Genesee County, though a few small areas of steep gorges occur in the southern part.

Athletic fields.—These areas are used for tennis courts, baseball fields, and facilities for other sports. Because the areas must be nearly level, heavy grading or shaping may be needed. For this reason, all the major properties of the soils should be considered in selecting suitable locations.

for selected nonfarm uses of the soils—Continued

Pipeline installations	Lawns, landscaping, and golf fairways	Campsites	Play areas and picnic areas (extensive use)	Athletic fields
Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.
Severe: poor stability of fine sand and very fine sand in cuts; seasonally high water table.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.	Moderate: seasonally high water table ½ foot to 1½ feet below surface.	Severe: seasonally high water table ½ foot to 1½ feet below surface.
Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.	Severe: prolonged high water table at surface; frequent flooding.
Severe: prolonged high water table at surface; instability of soil material.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.	Severe: prolonged high water table at surface; ponding in some places.

Descriptions of the Soils

This section describes the soil series and mapping units of Genesee County. The acreage and proportionate extent of each mapping unit are given in table 9.

The procedure in this section is first to describe the soil series, and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read the description of the soil series to which it belongs.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Alluvial land, for example, does not belong to a soil series, but nevertheless, is listed in alphabetical order along with the soil series.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and the woodland suitability group in which the mapping unit has been placed. The pages on which each capability unit and each woodland group are described can be found by referring to the "Guide to Mapping Units" at the back of the survey.

Statements referring to the supply of plant nutrients are for the soils in areas that have not been fertilized.

Alden Series

The Alden series consists of deep soils that are very poorly drained and high in lime content. They formed mainly in loamy or silty glacial till, but in some places the upper part formed in local alluvium washed from the Lyons, Ilion, or Romulus soils or from their drier associates.

The surface layer is black silt loam that ranges from 3 to 10 inches in thickness and from 6 to 20 percent in content of organic matter. The total supply of nitrogen in this layer is high, but it is released slowly. The phosphorus- and potassium-supplying power is moderate. In drained areas the surface layer is porous and in excellent tilth for root growth.

The subsoil of Alden soils is a gray silt loam. The gray color indicates gleying, or reduction of iron compounds, and is evidence that this layer has been wet most of the time. The subsoil generally contains a few distinct mottles, but where it is thicker than average, it has more mottles in the lower part. This layer is nearly neutral. It extends to a depth of 20 to 40 inches.

The grayish substratum is generally more mottled than the layer above. It also is more firm and contains free lime.

The water table is at or near the surface throughout April. In May, it falls between rains but usually is within 10 inches of the surface. As the growing season progresses, the water table recedes more quickly after rains and falls to greater depths during dry periods. Unless the soils are artificially drained, they can support farm machinery only in exceptionally dry periods of midsummer.

Alden mucky silt loam (0 to 3 percent slopes) (Ad).—This very poorly drained soil lies in depressional areas that collect surface runoff from adjacent areas and remain ponded until late in spring or early in summer. Its surface layer is about 10 inches thick and is free of stones.

The larger areas of this soil are generally wooded, but smaller areas are most commonly used for pasture. The soil can be used for row crops if it is adequately drained, though outlets deep enough for tile are difficult to establish. Where drainage is adequate, the response of crops to fertilization is good.

For nonfarm uses of this soil, wetness and low position in the landscape are severe limitations. (Capability unit IVw-4; woodland suitability group 21)

Allis Series

The Allis series consists of acid, poorly drained soils that lie in flat or depressional areas where runoff collects. These soils formed in moderately fine textured or fine textured, shaly glacial till, and they are underlain by soft

TABLE 9.—*Approximate acreage and proportionate extent of the soils*

Soil or land type	Area	Extent
	Acres	*Percent*
Alden mucky silt loam	2, 077	0. 6
Allis silty clay loam, deep, 0 to 4 percent slopes	1, 943	. 6
Alluvial land	410	. 1
Angola silt loam, 0 to 3 percent slopes	809	. 3
Angola silt loam, 3 to 8 percent slopes	1, 040	. 3
Appleton silt loam, 3 to 8 percent slopes	871	. 3
Arkport very fine sandy loam, 1 to 6 percent slopes	4, 439	1. 4
Arkport very fine sandy loam, 6 to 12 percent slopes	1, 036	. 3
Arkport and Dunkirk soils, 12 to 20 percent slopes	689	. 2
Arkport and Dunkirk soils, 20 to 40 percent slopes	545	. 2
Benson soils, 0 to 8 percent slopes	4, 735	1. 5
Benson soils, 8 to 25 percent slopes	1, 092	. 4
Benson soils, 25 to 40 percent slopes	773	. 2
Burdett silt loam, 0 to 3 percent slopes	1, 118	. 3
Burdett silt loam, 3 to 8 percent slopes	1, 583	. 5
Canandaigua silt loam, 0 to 2 percent slopes	5, 947	1. 8
Canandaigua mucky silt loam, 0 to 2 percent slopes	2, 063	. 6
Cazenovia silt loam, 0 to 3 percent slopes	1, 056	. 3
Cazenovia silt loam, 3 to 8 percent slopes	4, 747	1. 5
Cazenovia silt loam, 8 to 15 percent slopes	1, 323	. 4
Cazenovia silty clay loam, 8 to 15 percent slopes, eroded	541	. 2
Cazenovia silty clay loam, 15 to 25 percent slopes, eroded	458	. 1
Chenango shaly silt loam, 0 to 3 percent slopes	671	. 2
Chenango shaly silt loam, 3 to 8 percent slopes	710	. 2
Chenango shaly silt loam, 8 to 15 percent slopes	553	. 2
Collamer silt loam, 2 to 6 percent slopes	4, 310	1. 3
Colonie loamy fine sand, 2 to 6 percent slopes	1, 189	. 4
Colonie loamy fine sand, 6 to 12 percent slopes	652	. 2
Conesus silt loam, 0 to 3 percent slopes	1, 071	. 3
Conesus silt loam, 3 to 8 percent slopes	2, 708	. 8
Conesus silt loam, 8 to 15 percent slopes	685	. 2
Darien silt loam, 0 to 3 percent slopes	1, 465	. 5
Darien silt loam, 3 to 8 percent slopes	4, 239	1. 3
Darien silt loam, 8 to 15 percent slopes	1, 275	. 4
Darien silt loam, 15 to 25 percent slopes	178	. 1
Dunkirk silt loam, 2 to 6 percent slopes	2, 425	. 8
Dunkirk silt loam, 6 to 12 percent slopes	1, 075	. 3
Edwards muck	980	. 3
Eel silt loam	3, 558	1. 1
Elnora loamy fine sand, 2 to 6 percent slopes	1, 559	. 5
Fonda mucky silt loam	2, 752	. 9
Fremont silt loam, 0 to 3 percent slopes	1, 255	. 4
Fremont silt loam, 3 to 8 percent slopes	2, 078	. 6
Fremont silt loam, 8 to 15 percent slopes	650	. 2
Fresh water marsh	346	. 1
Galen and Minoa very fine sandy loams, 0 to 2 percent slopes	4, 829	1. 5
Galen very fine sandy loam, 2 to 6 percent slopes	3, 177	1. 0
Genesee silt loam	1, 522	. 5
Halsey silt loam, 0 to 4 percent slopes	2, 977	. 9
Hilton loam, 0 to 3 percent slopes	4, 870	1. 5
Hilton loam, 3 to 8 percent slopes	8, 103	2. 6
Holly silt loam	848	. 3
Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes	3, 047	1. 0
Hornell silty clay loam, 3 to 8 percent slopes, eroded	1, 628	. 5
Hornell silty clay loam, 8 to 15 percent slopes, eroded	788	. 2
Hornell and Fremont soils, 15 to 25 percent slopes, eroded	577	. 2
Ilion silt loam, 0 to 3 percent slopes	6, 401	2. 0
Ilion silt loam, 3 to 8 percent slopes	1, 379	. 4
Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes	606	. 2
Lakemont silty clay loam	2, 239	. 7
Lamson very fine sandy loam	5, 769	1. 8
Lamson mucky very fine sandy loam	2, 920	. 9
Lansing silt loam, 3 to 8 percent slopes	2, 701	. 8
Lansing silt loam, 8 to 15 percent slopes	2, 039	. 6
Lansing silt loam, 15 to 25 percent slopes	807	. 3
Lima silt loam, 0 to 3 percent slopes	8, 673	2. 7
Lima silt loam, 3 to 8 percent slopes	10, 823	3. 4
Lima silt loam, moderately deep variant, 0 to 3 percent slopes	1, 420	. 4
Lima silt loam, moderately deep variant, 3 to 8 percent slopes	937	. 3
Lyons and Appleton silt loams, 0 to 3 percent slopes	10, 248	3. 2
Lyons and Kendaia silt loams, 0 to 3 percent slopes	4, 170	1. 3
Madalin silty clay loam	6, 242	2. 0
Made land, tillable	156	[1]
Made land and Dumps	497	. 2
Manheim silt loam, 0 to 3 percent slopes	1, 520	. 5
Manheim silt loam, 3 to 8 percent slopes	3, 854	1. 2
Manlius very shaly silt loam, 3 to 8 percent slopes	1, 017	. 3
Manlius very shaly silt loam, 8 to 15 percent slopes	1, 238	. 4
Manlius very shaly silt loam, 15 to 25 percent slopes	579	. 2
Manlius very shaly silt loam, 25 to 40 percent slopes	566	. 2
Marilla shaly silt loam, 0 to 3 percent slopes	466	. 1
Marilla shaly silt loam, 3 to 8 percent slopes	1, 234	. 4
Marilla shaly silt loam, 8 to 15 percent slopes	688	. 2
Middlebury silt loam	503	. 2
Mohawk silt loam, 2 to 8 percent slopes	3, 039	1. 0
Mohawk silt loam, 8 to 15 percent slopes	2, 212	. 7
Mohawk silt loam, 15 to 25 percent slopes	847	. 3
Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes	718	. 2
Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes	710	. 2
Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes	528	. 2
Muck, deep	3, 521	1. 1
Muck, shallow	4, 913	1. 5
Niagara and Collamer silt loams, 0 to 2 percent slopes	5, 819	1. 8
Nunda silt loam, 3 to 8 percent slopes	1, 588	. 5
Nunda silt loam, 8 to 15 percent slopes	1, 455	. 5
Nunda silt loam, 15 to 25 percent slopes	680	. 2
Odessa silt loam, 0 to 2 percent slopes	1, 690	. 5
Odessa silt loam, 2 to 6 percent slopes	1, 448	. 5
Ontario loam, 0 to 3 percent slopes	4, 202	1. 3
Ontario loam, 3 to 8 percent slopes	22, 824	7. 2
Ontario loam, 8 to 15 percent slopes	4, 584	1. 5
Ontario loam, 15 to 25 percent slopes	1, 094	. 3
Ontario and Lansing soils, 25 to 40 percent slopes	1, 142	. 4
Ontario stony loam, 2 to 8 percent slopes	1, 522	. 5
Ontario stony loam, 8 to 15 percent slopes	538	. 2
Ovid silt loam, 0 to 3 percent slopes	4, 653	1. 4
Ovid silt loam, 3 to 8 percent slopes	4, 881	1. 5
Palmyra gravelly loam, 0 to 3 percent slopes	2, 656	. 8
Palmyra gravelly loam, 3 to 8 percent slopes	5, 271	1. 6
Palmyra gravelly loam, 8 to 15 percent slopes	3, 517	1. 1
Palmyra and Arkport soils, 15 to 25 percent slopes	1, 755	. 5
Palmyra and Arkport soils, 25 to 40 percent slopes	1, 255	. 4
Palmyra shaly silt loam, 0 to 3 percent slopes	523	. 2
Palmyra shaly silt loam, 3 to 8 percent slopes	983	. 3
Palmyra shaly silt loam, 8 to 15 percent slopes	994	. 3
Phelps and Fredon gravelly loams, 0 to 3 percent slopes	2, 970	. 9

TABLE 9.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil or land type	Area	Extent
	Acres	*Percent*
Phelps gravelly loam, 3 to 8 percent slopes	3, 156	1. 0
Remsen silt loam, 0 to 3 percent slopes	1, 570	. 5
Remsen silt loam, 3 to 8 percent slopes	4, 778	1. 5
Remsen silt loam, 8 to 15 percent slopes	1, 722	. 5
Remsen silty clay loam, 3 to 8 percent slopes, eroded	1, 333	. 4
Remsen silty clay loam, 8 to 15 percent slopes, eroded	1, 647	. 5
Remsen silty clay loam, 8 to 25 percent slopes, severely eroded	443	. 1
Remsen silty clay loam, 15 to 25 percent slopes, eroded	992	. 3
Remsen soils, 25 to 40 percent slopes	727	. 2
Remsen soils, 25 to 40 percent slopes, severely eroded	450	. 1
Rhinebeck silt loam	2, 274	. 7
Rockland, limestone	1, 543	. 5
Romulus silt loam	1, 566	. 5
Schoharie silt loam, 1 to 6 percent slopes	1, 244	. 4
Schoharie silty clay loam, 6 to 12 percent slopes, eroded	645	. 2
Schoharie silty clay loam, 12 to 20 percent slopes, eroded	648	. 2
Schoharie soils, 20 to 40 percent slopes, eroded	322	. 1
Scio silt loam, 2 to 8 percent slopes	839	. 3
Sloan silt loam	1, 281	. 4
Stafford loamy fine sand, 0 to 2 percent slopes	2, 044	. 6
Wayland silt loam	5, 281	1. 6
Warners loam	922	. 3
Gravel Pits	961	. 3
Quarries	501	. 2
Water (in impoundments less than 40 acres in size)	1, 482	. 5
Total	320, 640	100. 0

[1] Less than 0.05 percent.

shale at a depth ranging from 2 to 5 feet. Their acreage is limited to the extreme southern part of the county from the town of Bethany westward to the Erie County line.

The Allis soils have a very dark gray or very dark grayish-brown surface layer that ranges from 6 to 10 inches in thickness and from 3 to 7 percent in organic-matter content. This layer generally is silty clay loam, but in small areas it is silt loam. It is strongly acid and friable. If it has not been thoroughly mixed by tillage, it contains variegated colors along old root channels. The nitrogen and potassium supplies in this layer are moderate, but the phosphorus reserve is low.

Underlying the surface layer is a gray, prominently mottled subsurface layer that is similar to the surface layer in texture, reaction, and content of phosphorus and potassium. The grayish mottles indicate prolonged wetness. This layer extends to a depth of 8 to 13 inches.

The subsoil of Allis soils ranges from silty clay loam to clay. It is prominently mottled and strongly acid. Its content of phosphorus is low, and that of potassium is moderate. This layer extends to a depth of 24 to 40 inches.

The substratum is clayey shale till that is strongly acid and compact.

These soils generally are nearly level. In some places, however, they are slightly convex or very gently sloping, and here they are slightly better drained.

The Allis soils remain wet well into spring. In April, the water table normally is within 12 inches of the surface, but it falls to a depth of 24 inches in May. After June, the soil can be plowed following 10 to 14 consecutive drying days. During dry periods of midsummer, the water table falls to a depth ranging from 10 to 50 feet.

Natural fertility is low in these soils. Although the subsoil contains a moderate amount of potassium, the potassium is slowly available. The Allis soils are not so droughty as the associated Hornell soils, because their surface layer has a higher content of organic matter.

Allis silty clay loam, deep, 0 to 4 percent slopes (AeA).—This nearly level and gently sloping, acid soil receives a considerable amount of runoff from adjacent soils, chiefly the Hornell and Fremont, and it remains wet until late in spring or early in summer. In the most northerly areas of its occurrence in Genesee County, near areas of Illion soils, it is less acid than typical Allis soils.

This soil generally is too wet for row crops. Because permeability is slow, the soil is difficult to drain by tile, but removing excess water through surface drains will permit fairly good growth of hay crops. Water-tolerant grasses and legumes should be used. The more depressional areas generally are good sites for ponds.

Nonfarm uses of this soil are limited mainly by prolonged wetness and the clayey, compact subsoil. (Capability unit IVw–2; woodland suitability group 18)

Alluvial Land

Alluvial land (Al) consists of several different kinds of soil material deposited on first bottoms. It generally lies in narrow strips along the smaller streams, but it also occurs in some of the wider tributary streams, where local areas are affected by riverwash. Drainage, texture, and natural fertility vary considerably within short distances.

This land is used mainly for pasture, though areas that are dominantly riverwash produce poor pasture. Areas capable of producing good pasture are difficult to manage, for they commonly are long, narrow channels bounded by steep banks that cut them off from adjoining fields.

Annual flooding is a hazard and seriously affects any use made of this land. (Capability unit Vw–1; woodland suitability group 20)

Angola Series

The Angola series consists of somewhat poorly drained soils that have a medium-textured to moderately fine textured subsoil. These soils are 20 to 40 inches deep over shaly bedrock that is moderately hard but is not so hard as the limestone common in the county.

The plow layer of Angola soils is very dark grayish-brown silt loam having a moderately high content of organic matter. It contains a moderate supply of plant nutrients.

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The subsurface layer extends to a depth of about 12 inches. It is grayish-brown silt loam that is prominently mottled. The mottles indicate that this layer is saturated with water periodically. In summer, however, it does dry out.

The subsoil is shaly silt loam to shaly silty clay loam that is mottled gray and brown. In most places this layer contains more clay than the layers above it. Because it is close to bedrock, it also contains more coarse fragments.

In April, ground water is at a depth of 4 to 16 inches in the Angola soils. During this month, 5 to 7 consecutive drying days are needed before the soil can be plowed. In May, 3 to 5 consecutive drying days are needed.

These soils are moderately difficult to cultivate, but they are not so cloddy or so plastic as the Remsen soils.

Angola silt loam, 0 to 3 percent slopes (AnA).—This somewhat poorly drained, nearly level soil is 20 to 40 inches deep over shale or hard limestone. In most places where limestone occurs as underlying rock, it is not more than 4 to 6 inches thick over bedded shale.

Although drainage is somewhat poor in this soil, installing tile drains is difficult or not feasible. In dry periods, sod crops ordinarily show the effects of insufficient moisture sooner on this soil than they do on a deeper but otherwise similar Darien soil.

For nonfarm uses, the major limitations are wetness and the limited depth to bedrock. (Capability unit IVs–3; woodland suitability group 16)

Angola silt loam, 3 to 8 percent slopes (AnB).—This somewhat poorly drained soil is gently sloping or undulating and is 20 to 40 inches deep over shale or hard limestone. The underlying limestone, where present, is thin. The depth to bedrock is more variable than that of Angola silt loam, 0 to 3 percent slopes, and small included areas are more than 40 inches deep to bedrock.

Installing tile drains in this soil is difficult or not feasible. During dry periods, crops show the effects of insufficient moisture sooner on this soil than on a deeper but otherwise similar Darien soil.

Nonfarm uses are limited mainly by wetness and depth to bedrock. (Capability unit IVs–3; woodland suitability group 16)

Appleton Series

In the Appleton series are deep, medium-textured, somewhat poorly drained soils that formed in glacial till having a moderately high content of lime. These soils occupy gently sloping areas that receive runoff from adjacent soils.

The surface layer is very dark grayish-brown silt loam that normally ranges from 6 to 12 inches in thickness and is 5 to 8 percent organic matter. This layer is porous, has crumb structure, and contains a few pebbles. Generally, it is slightly acid. The potassium- and phosphorus-supplying power is moderate. In many places the surface layer is covered with a considerable amount of material that washed from nearby soils.

The subsurface layer is pale-brown loam 5 to 10 inches thick. It contains many yellowish-brown mottles, which indicate that it is periodically saturated with water. When it is not saturated, this layer is easily penetrated by roots. It is slightly acid, and its supply of potassium and phosphorus is moderate.

The subsoil normally contains more clay than the layers above and below it. It is generally loam, but in places it is heavy silt loam. It extends to a depth of 30 to 42 inches, and its many, distinct, yellowish-brown mottles indicate that this layer is subject to periodic saturation. When it is not saturated, it is easily penetrated by roots and water, but wetness restricts root growth for long periods. The layer is neutral or nearly neutral, and it has moderate capacity to supply phosphorus.

The substratum is glacial till consisting of dense, calcareous gritty or gravelly loam or silt loam. The depth to unconsolidated till ranges from 42 inches to 20 feet.

In undrained areas, the water table in Appleton soils fluctuates between the depths of 3 and 12 inches during most of April. In May, the water table rises to within 6 inches of the surface after a rain. During this month, 3 to 6 consecutive drying days are needed before the soil can be cultivated. In June, 2 to 4 consecutive drying days are needed. By midsummer, the water table is usually at a great depth. If a drought occurs in midsummer, the Appleton soils generally can provide more moisture to plants than adjacent better drained soils.

The high organic-matter content in the surface layer indicates that this layer has a high content of total nitrogen. In spring, however, the nitrogen is released so slowly that crops respond to applications of this element. Additions of fertilizer containing nitrogen, phosphorus, and potassium are needed for optimum productivity. The surface layer of Appleton soils has a moderately high capacity to absorb and to hold these nutrients.

These soils are potentially productive, but adequate drainage is needed for favorable growth of crops.

Appleton silt loam, 3 to 8 percent slopes (ApB).—This gently sloping soil occupies areas that receive runoff from adjacent slopes. Included with it, generally in depressions and drainageways, are small areas of poorly drained Lyons soils. Also included, on the crests of small undulations between drainageways, are small areas of moderately well drained Conesus or Hilton soils. Locally, somewhat poorly drained Kendaia soils occur as small inclusions.

This soil can be used for crops, pasture, or woodland. Improved drainage will make it more suitable for cropping. The larger drainageways should be left in sod.

Wetness and excessive runoff received from higher areas are serious limitations that affect nonfarm uses of this soil. (Capability unit IIIw–5; woodland suitability group 15)

Arkport Series

In the Arkport series are deep, well-drained soils that formed in sandy lake deposits. They occupy deltas formed where sand was dropped as streams entered glacial lakes. They occur mainly in the Tonawanda Creek basin, but smaller areas are in the Black Creek and Oatka Creek basins. These soils contain enough fine material that they are not overly droughty. Thin bands of brown, sticky very fine sandy loam are conspicuous in the subsoil. Arkport soils are moderately acid in the surface layer but are calcareous in the substratum.

The surface layer in cultivated fields is dark grayish-brown very fine sandy loam containing 2 to 4 percent organic matter. This layer is porous and permits good root development. It has only moderate water-holding capacity. If unlimed, it is medium acid in most places. It has a low potassium reserve and low phosphorus-supplying power.

Underlying the surface layer, at a depth of about 9 inches, is a thin subsurface layer of yellowish-brown very fine sandy loam.

The brown upper part of the subsoil is porous very fine sandy loam. It extends to a depth of 16 to 22 inches, and its bright color indicates that the layer is well aerated. This layer is excellent for root growth, but it can store only a moderate supply of water. In most places it is strongly acid and its supply of available nutrients is low or moderately low.

The part of the subsoil that extends to a depth of 40 to 60 inches is light-brown, loose loamy fine sand in which there are bands of brown, firmer very fine sandy loam 1/4 to 2 inches thick. These bands hold moisture and retard the movement of water down through the soil. Thus, they lengthen the time that summer rainwater remains in the root zone. This banded zone ranges from moderately acid to neutral, and the acidity generally decreases with depth. The supply of nitrogen and potassium is low; the supply of phosphorus is moderately low.

The substratum consists of alternating layers of fine sand, very fine sand, and coarse silt. In most areas the substratum is coarser textured than the layers above it. Consequently, water moves through it readily. In some places the thin layers of silt improve its water-holding capacity. Roots penetrate rather well. In some places the substratum is as much as 40 feet thick. Normally, bedrock lies at a great depth.

Although the Arkport soils are saturated during rainy periods in spring, the water disappears quickly after the rain stops. During April, only 2 or 3 consecutive drying days are needed before these soils can be cultivated. During May and June, 1 or 2 days are sufficient. The Arkport soils are among the first in the county to be ready for cultivation in spring.

Deep-rooted crops like alfalfa may draw water from a depth of as much as 5 feet, but the root zone is confined mainly to the topmost 30 to 40 inches. This zone can hold between 3 1/2 and 5 inches of water available to plants.

The Arkport soils are low in fertility and, in moderately sloping areas, are erodible. Nevertheless, they respond extremely well to fertilization and can be productive if properly managed.

Arkport very fine sandy loam, 1 to 6 percent slopes (ArB).—This soil is on nearly level to gently convex slopes that receive no runoff from adjoining soils. It generally occurs on the top of dunelike ridges having smooth slopes, but the relief is gently undulating in a few places. Here, small inclusions of the moderately well drained Galen soils lie in depressional areas. Also included, in areas where the bands of finer textured material are less evident or missing in the subsoil, are small areas of Colonie soils.

This soil is well suited to crops, pasture, or woodland. Crops respond well to lime and fertilizer, but in dry periods they may require irrigation for optimum yields. Limitations on use of all types of equipment are only slight. Soil blowing is a hazard in exposed fields.

This soil has only a few limitations that affect nonfarm uses. It is usually dry enough for easy grading, though the stability for large structures is somewhat limited. Generally, the substratum is quite permeable. (Capability unit IIe-3; woodland suitability group 1)

Arkport very fine sandy loam, 6 to 12 percent slopes (ArC).—This soil is on short side slopes of dunelike deposits and on the top and sides of smaller mounds. On gentle lower slopes below it are the moderately well drained Galen soils. Locally, Colonie soils are included, and these significantly affect suitability because their substratum is dominantly sand. In the Pembroke area, small tracts of the finer textured Dunkirk soils are commonly included.

This soil is suited to almost all crops grown in the county, as well as to pasture and woodland. In some areas, however, conserving the soil by use of stripcropping, terracing, or other measures is difficult because slopes are short and irregular. The limitation on the use of equipment, especially large equipment, is slight to moderate. The wheels of tractors pulling heavy implements are easily buried.

Nonfarm uses of this soil are limited mainly by slope. In areas where slope is reduced through grading, the soil makes good sites for homes. (Capability unit IIIe-3; woodland suitability group 1)

Arkport and Dunkirk soils, 12 to 20 percent slopes (AsD).—The soils in this undifferentiated group are on the moderately steep sides of sandy and silty lacustrine deposits. They occur mostly in the town of Pembroke. About 60 percent of the total acreage is Arkport very fine sandy loam, 35 percent is Dunkirk silt loam, and 5 percent is small areas of other soils included in mapping. Any given area may consist of the Arkport soil, the Dunkirk soil, or both soils in any proportion. Among the inclusions are small areas of Arkport or Dunkirk soil having slopes of less than 12 percent. On adjacent lower slopes are the gently sloping Galen or Collamer soils.

The soils in this group can be used for crops, pasture, or woodland. If they are row cropped, the soils are susceptible to erosion and, in many areas, are eroded and contain less organic matter than normal. They are more droughty than more mildly sloping soils nearby, and their supply of available nutrients generally is smaller because their plowed layer is thinner than that of adjacent soils. The limitation on the use of light equipment is moderate, and on heavy equipment, severe. The wheels of tractors pulling heavy equipment are easily buried.

Nonfarm uses of these soils are limited mainly by moderately steep slopes. Some excellent homesites can be made available where slopes are reduced to a suitable gradient. (Capability unit IVe-1; woodland suitability group 1)

Arkport and Dunkirk soils, 20 to 40 percent slopes (AsE).—These soils occupy the steep and very steep sides of sandy and silty lacustrine deposits. They occur mostly in the towns of Pembroke and Batavia. Arkport soil makes up 60 percent of the total acreage; Dunkirk soil, 35 percent; and included areas of other soils, 5 percent. Any given area may consist of Arkport soil, of Dunkirk soil, or some of both. Among the included areas are ones having slopes of less than 20 percent.

The soils in this group are too steep for row cropping. Some of the less steep areas can be used for pasture, but they are difficult to fertilize. The soils are well suited to trees.

Steep slopes severely limit nonfarm uses of these soils. Through grading, some plots can be made accessible for use as homesites. (Capability unit VIe–1; woodland suitability group 2)

Benson Series

The Benson series consists of medium-textured, well-drained to excessively drained soils that formed in glacial till and have a high content of lime. These soils are 10 to 20 inches deep over hard limestone bedrock. They lie in a narrow east-west band that crosses the central part of the county.

The surface layer is very friable, dark grayish-brown loam or silt loam, about 5 to 10 inches thick. Coarse fragments, mostly chert fragments of limestone, generally make up 5 to 35 percent of this layer. The organic-matter content is moderate, and the moisture-supplying capacity ranges from low to moderate. The layer is nearly neutral, is low in potassium content, and contains a moderate amount of nitrogen and phosphorus.

The subsoil generally is loam, though it ranges from loam to light silty clay loam. It is 5 to 40 percent coarse fragments, mostly chert fragments of limestone. It has low to moderate moisture-supplying capacity, is neutral to weakly calcareous, and contains a moderate supply of potassium and phosphorus.

Free water leaves the Benson soils soon after the spring thaw. They are then saturated for a short time after each heavy rain. Benson soils are among those that can be tilled earliest in spring. They are well suited to peas, spring-seeded small grain, and other early season crops, but they are likely to be droughty for later season crops. Although fractures in the bedrock permit some deep rooting, crops such as alfalfa do poorly in midseason. The water table falls to a great depth in the drier parts of the year.

Natural fertility is moderate, but plant growth is hindered by a limited root zone and droughtiness. The root zone can hold between 1½ and 2½ inches of available water.

For many uses of the Benson soils, the limited depth to hard limestone is a major limitation.

Benson soils, 0 to 8 percent slopes (BeB).—These shallow, high-lime soils occupy nearly level and gently sloping areas atop the limestone escarpment. Limestone crops out in some places. Included with these soils are many small areas of moderately deep Honeoye soils having similar slopes. Also included are small areas in which the layer of soil material over limestone is less than 10 inches thick.

These soils can be used for most crops, but they are less productive than deeper soils because their moisture-supplying capacity is low. Early season crops, such as peas and spring grain, do fairly well. The use of tillage equipment is moderately difficult.

For nonfarm uses, hard limestone bedrock near the surface is an important limitation. (Capability unit IIIs–1; woodland suitability group 19)

Benson soils, 8 to 25 percent slopes (BeD).—These shallow, high-lime soils occur in moderately sloping to moderately steep areas of the limestone escarpment. Generally, they are on the face, or front slope, of it. Limestone crops out in many places. The major inclusions are small areas of moderately deep Honeoye soils having similar slopes.

Most crops can be grown on these Benson soils, but production is low because of droughtiness. Rock outcrops and steep slopes make the use of tillage equipment difficult. Permanent hay, pasture, or woodland is a good use for these soils.

Nonfarm uses are limited by hard limestone bedrock at a depth of 1 to 2 feet and by moderate to steep slopes. (Capability unit IVs–1; woodland suitability group 19)

Benson soils, 25 to 40 percent slopes (BeE).—These shallow, high-lime soils are in steep and very steep areas of the limestone escarpment. Most areas are wooded, and here the soils have their original thin, dark-colored surface layer. In cultivated fields this layer has been mixed into the plow layer. The depth to bedrock varies within short distances. In some places it is as much as 3 feet, but limestone outcrops are common. Small areas in which the soil is deeper than 20 inches were mapped as inclusions.

These soils are better suited to trees than to cultivated crops. Areas mapped as these soils generally are more favorable for tree growth than less sloping Benson soils because they contain more included areas of moderately deep soils.

Nonfarm uses are limited mainly by steep slopes and shallowness to bedrock. (Capability unit VIIs–1; woodland suitability group 22)

Burdett Series

In the Burdett series are deep, somewhat poorly drained soils that formed in a mantle of silt, 20 to 40 inches thick, over clayey material. These nearly level and gently sloping soils occupy lower side slopes, mostly in the towns of Pavilion and Bethany.

The surface layer is very friable, very dark grayish-brown silt loam that ranges from 6 to 11 inches in thickness and from 3 to 5 percent in organic-matter content. It is moderately acid to neutral and has moderate to high moisture-supplying capacity. The content of nitrogen, potassium, and phosphorus is moderate. The subsurface layer is grayish-brown silt loam.

The upper part of the subsoil is similar to the surface layer in most respects, but it contains less organic matter and is lighter colored. It is distinctly mottled, which indicates that it is wet for some time in spring. Although the layer is friable, it is not readily penetrated by roots until it dries out. It extends to a depth of 20 to 40 inches.

The lower part of the subsoil is dark grayish-brown silty clay loam or silty clay. It is mottled, is more compact than the upper part of the subsoil, and is neutral to weakly calcareous. The reserve of phosphorus is medium, and that of potassium is high. This layer extends to a depth of 30 to 50 inches.

The substratum is compact, calcareous silty clay loam that contains few to many fragments of shale. Bedrock generally occurs at a depth ranging from 3½ to 10 feet, but locally it is as deep as 25 feet.

When frost leaves the ground in spring, these soils are saturated for a moderately short period. During April, 7 to 10 drying days are needed before the soils can be plowed. In May, 3 to 6 days are needed. After the initial saturation period, the water table generally falls to a great depth.

The Burdett soils are productive if they are adequately drained and otherwise are well managed.

Burdett silt loam, 0 to 3 percent slopes (BuA).—This nearly level soil occurs in areas where runoff is moderately slow. Its surface layer generally is similar to the one described for the series, but in places it has been slightly thickened by a covering of sediment washed from higher soils. Commonly included are small areas of the somewhat similar Darien soils and the poorly drained Ilion soils.

This soil is suited to crops, pasture, or woodland, but row crops generally cannot be successfully grown unless drainage is improved. The response to tiling is fair to good.

For nonfarm uses, the major limitations are slow permeability and prolonged wetness in spring. (Capability unit IIIw-1; woodland suitability group 16)

Burdett silt loam, 3 to 8 percent slopes (BuB).—This gently sloping soil is in areas that receive runoff from adjacent soils, mainly the better drained Nunda soils. In undulating areas, small inclusions of Nunda soils occupy the crests of small knolls that are surrounded by this Burdett soil. Also included are small areas of Darien or Appleton soils.

Row crops can be grown on this soil if wet spots and seepy areas are drained. The response to tiling is fair to good.

Nonfarm uses are limited chiefly by slow permeability and by prolonged wetness in spring. (Capability unit IIIw-4; woodland suitability group 16)

Canandaigua Series

The Canandaigua series consists of poorly drained and very poorly drained soils that lie in level or depressional areas. These soils formed in deep deposits, mainly layers of silt and very fine sand, laid down in glacial lakes.

The surface layer of Canandaigua soils is very dark gray or black silt loam 8 to 16 inches thick. This layer is saturated with water for long periods. It contains 8 to 20 percent organic matter and, in very poorly drained areas, is mucky. It is porous, however, and permits root development after the excess water is removed. In most places the layer is slightly acid or neutral. It has a high content of total nitrogen, which is readily available in drained areas. The capacity for supplying potassium and phosphorus is moderate.

The subsoil is silt loam that is prominently mottled but is dominantly gray or dark gray. This color is a result of prolonged wetness. In undrained areas, few roots penetrate the subsoil, but roots grow to a depth of 15 to 20 inches if the soil is drained. The potassium- and phosphorus-supplying power is moderate. This layer is neutral. It extends to a depth ranging from 20 to 40 inches.

The calcareous substratum is stratified with layers of silt and very fine sand, but the silt is dominant. In some places there also are thin layers of clay, which reduces permeability. Although the substratum is well supplied with nutrients and lime, it is penetrated by only a few roots.

Water stands on the surface of these soils for long periods in April. The water table may fall to a 6-inch depth for a short time in April and to a 20-inch depth for a short time in May. Normally, it resumes falling about the first of June but rises to within a few inches of the surface after each major rain.

In undrained areas the Canandaigua soils are suited only to sod crops. If drainage is improved, the water table can be controlled at a desired level until June. It falls during dry periods of midsummer, but the soils receive runoff and seepage after each rain. For this reason, moisture deficiency is not commonly a limitation, even in drained areas. The nutrient reserves are high in these soils, and few areas need lime.

Canandaigua silt loam, 0 to 2 percent slopes (CaA).—This nearly level, poorly drained soil occupies low areas that receive runoff from surrounding soils. Locally, small areas of the more sandy Lamson soils are included.

This soil remains wet for a considerable time in spring. During April, the water table fluctuates between the surface and a depth of 12 inches. In May, it falls to a depth of 20 inches between rains. Crops do well in fields where drainage is adequate, but outlets may be difficult to install. Undrained areas can be used for pasture except early in spring, when grazing is likely to damage the surface layer.

Prolonged wetness and unstable layers in the substratum are the major limitations affecting nonfarm uses of this soil. (Capability unit IVw-1; woodland suitability group 20)

Canandaigua mucky silt loam, 0 to 2 percent slopes (CdA).—This very poorly drained soil lies in depressional areas that are ponded until late in spring. The surface layer is mucky, especially in wooded areas, and in places the muck is as much as 12 inches thick. In cleared fields the surface layer generally contains less organic matter than in undisturbed areas. Included with this soil are small areas of the more sandy Lamson soils. Also included, in the lowest part of some depressions, are small spots of shallow muck.

Where undrained, this soil is suited only to plants used for summer pasture. Although adequate drainage is needed, outlets deep enough for tile lines are difficult to establish. In fields where drainage can be improved, crops will do well on this soil, especially in drier growing seasons. Many places are good sites for dug ponds.

Nonfarm uses are severely limited by wetness and by accumulating water from higher areas. (Capability unit IVw-4; woodland suitability group 21)

Cazenovia Series

Soils of the Cazenovia series are deep, medium textured or moderately fine textured, slightly acid or neutral, and well drained or moderately well drained. They formed in reddish, high-lime, clayey till derived from limestone, shale, or a mixture including reworked lake sediments. These soils occur in the northern half of the county; the largest acreage lies just north of the Onondaga limestone escarpment.

The surface layer of Cazenovia soils is dark-brown silt loam that has a moderately high content of organic matter. It is porous, can hold a good supply of moisture available to plants, is moderately supplied with nitrogen, potassium, and phosphorus, and permits good root growth. In places this layer is as much as 10 inches thick.

Underlying the surface layer, and similar to it in texture and mineral content, is a thin, leached subsurface layer that has a low organic-matter content. This layer is porous and, though it contains a few pebbles, is easily penetrated by roots. It extends to a depth of 12 to 15 inches and may be faintly mottled. In many places that have been deep plowed or have lost some of the original surface layer through erosion, the subsurface layer has been mixed into the plow layer.

The subsoil begins at a depth of 12 to 15 inches and extends to a depth of 24 to 36 inches. This reddish-brown layer contains more clay than the layers above. Typically, it is heavy silty clay loam, but the texture varies within short distances and in places is light silty clay. In well-drained areas the subsoil is faintly mottled but only in the lower part. In moderately well drained areas, however, most of this layer contains many distinct mottles of yellowish brown. Although the subsoil is clayey, its blocky structure permits roots and water to move between the blocks. A moderately high potassium reserve is associated with the clay content, and the phosphorus-supplying power is medium.

The substratum is glacial till consisting of dense, calcareous, reddish-brown gravelly heavy loam to clay loam. In places where the till includes reworked lake deposits, the texture varies within short distances. The depth to bedrock, mainly reddish shale, ranges from 3½ to 25 feet.

In April, free water is within 6 inches of the surface after some rains and generally is at a depth of less than 20 inches between rains. During this month, 3 to 6 consecutive drying days are needed before the soil can be cultivated. In May, the water table is below a depth of 20 inches most of the time and, during rainless periods, is below a depth of 30 inches.

Although some roots extend to a depth of 26 inches, most of them are concentrated in the topmost 20 to 26 inches, a volume of soil that can hold between 3 and 4 inches of moisture available to plants.

Cazenovia silt loam, 0 to 3 percent slopes (CeA).—This moderately well drained soil occupies the higher parts of the landscape, where it receives no excess water from adjacent areas. Runoff is slow, but ponding is not a hazard. The risk of erosion is only slight. Included with this soil, especially along drainageways, are small areas of somewhat poorly drained Ovid soils.

This soil is well suited to crops, pasture, or woodland. After rain, however, it remains wet for a longer time than more sloping Cazenovia soils. If tilled when too wet, it is likely to puddle and then to crust as it dries.

Nonfarm uses of this soil are limited by seasonal wetness. (Capability unit IIw-2; woodland suitability group 8)

Cazenovia silt loam, 3 to 8 percent slopes (CeB).—This soil is in gently undulating areas and on gentle, longer side slopes that are convex. Included with it, in troughs of undulating areas and along drainageways, are small areas of somewhat poorly drained Ovid soils.

This soil is well suited to crops, pasture, or woodland. If mismanaged, it tends to puddle when wet and to crust as it dries.

A slowly permeable substratum is the main limitation affecting nonfarm uses of this soil. (Capability unit IIe-6; woodland suitability group 8)

Cazenovia silt loam, 8 to 15 percent slopes (CeC).—This moderately sloping soil is highly susceptible to erosion and is more readily damaged by uncontrolled runoff than other medium-textured soils, such as the Ontario. Included with it are small areas of eroded Cazenovia soils. Less common inclusions are small areas of finer textured Schoharie soils and of slightly coarser textured Ontario soils.

This soil is suited to most crops and to pasture and woodland. Because of slope, the limitation on the use of equipment is moderate.

Many nonfarm uses are limited by slope and by slow permeability in the subsoil. (Capability unit IIIe-4; woodland suitability group 8)

Cazenovia silty clay loam, 8 to 15 percent slopes, eroded (CgC3).—This moderately sloping soil has lost a substantial amount of its original surface layer through erosion, and part of the finer textured subsoil has been mixed into the plow layer. Included in areas mapped as this soil are small areas of uneroded Cazenovia soils. Also included are small areas of finer textured Schoharie soils and of slightly coarser textured Ontario soils.

Crops, pasture, and trees can be grown on this soil. But the rate of seed germination is considerably lower on this soil than on uneroded soils, and crops show the effects of drought sooner. The limitation on the use of equipment is moderate.

Nonfarm uses are limited by slope, loss of soil material through erosion, and slow permeability in the subsoil. (Capability unit IVe-5; woodland suitability group 8)

Cazenovia silty clay loam, 15 to 25 percent slopes, eroded (CgD3).—This moderately steep soil has lost a substantial part of its original surface layer through erosion. In some places on slope shoulders, there are thin patches of gravel. Small areas of uneroded Cazenovia soils are included in wooded areas, on the edge of areas mapped as this soil, and along hedgerows and road shoulders in cultivated areas. Also included are small areas of finer textured Schoharie soils.

This soil is suitable for pasture and woodland. Seeds germinate at a low rate, however, because the surface layer is in poor condition and because too little moisture is available to plants. Rapid runoff causes a severe hazard of erosion.

A slowly permeable subsoil and moderately steep slopes are limitations affecting nonfarm uses of this soil. (Capability unit VIe-2; woodland suitability group 8)

Chenango Series

Soils of the Chenango series are deep, acid, medium textured, and well drained. They formed in gravelly material that includes a few sandy lenses. The gravel consists mostly of acid, brittle, dark-colored shale, and it contains only a few fragments of durable, hard limestone, sandstone, or granite. The Chenango soils occur on shaly terraces in the main valleys adjacent to the Wyoming County line.

The dark grayish-brown surface layer generally is shaly silt loam. This very friable layer is 7 to 10 inches thick. It contains little organic matter but has high moisture-supplying capacity. It is strongly acid and has a low content of nitrogen, phosphorus, and potassium.

The subsoil is yellowish-brown shaly silt loam that is friable and well aerated. It is strongly acid or very strongly acid and has low reserves of potassium and phosphorus. This layer extends to a depth of 24 to 42 inches.

The substratum consists of stratified material, mainly brown very shaly silt loam, that is moderately acid. In some places in the upper Black Creek valley, the texture ranges to gravelly fine sandy loam. The substratum extends to a depth ranging from 4 to 40 feet.

After frost leaves the Chenango soils in spring, the level of free water falls rapidly. For a short time following a heavy rain, the water table is less than 24 inches below the surface, but during dry periods of midsummer, it falls to a great depth. In April, 2 or 3 consecutive drying days are needed before the soil can be plowed. Beginning in May, only 1 or 2 days are needed.

These soils have very low natural fertility. Their capacity for storing moisture is moderate, about 3 to 3½ inches in the uppermost 2 feet. The soils can usually supply moisture to row crops during periods of drought, because ¼ to ½ inch of rainwater penetrates these soils to about three times the depth that it would in a soil free of coarse fragments. This greater depth of moisture penetration, together with reduced evaporation because of shale fragments covering the surface, enables plants to obtain more benefit from light showers. These soils respond well to good management.

Chenango shaly silt loam, 0 to 3 percent slopes (ChA).—This acid, well-drained, gravelly soil occurs mainly in four large areas on terraces in the town of Darien. It is the soil described as typical for the series. Included with it are small areas of acid, moderately well drained, gravelly soils that are mottled at a depth of about 20 inches.

Most of the common crops can be grown on this soil, and they respond well to good management. Potatoes are especially well suited.

This soil has only a few limitations that affect nonfarm uses. (Capability unit I–2; woodland suitability group 6)

Chenango shaly silt loam, 3 to 8 percent slopes (CnB).—This soil is gravelly, acid, and well drained. It generally lies adjacent to nearly level, acid soils that occupy the tops of the few bench terraces in southern Genesee County. Small areas also occur along tributary streams in that part of the county. Included are small areas of moderately well drained, gravelly, acid soils that are mottled at a depth of 20 inches.

Most crops grown locally are suited to this soil, and they respond well to good management. Potatoes are well suited.

Only a few limitations affect nonfarm uses of this soil. (Capability unit IIe–2; woodland suitability group 6)

Chenango shaly silt loam, 8 to 15 percent slopes (CnC).—This acid, well-drained, gravelly soil is on the moderately sloping sides of bench terraces in the southern part of the county. The gravel is mainly dark shale. In most areas this soil is wooded, and in these it has a thin, dark surface layer underlain by a thin, highly leached subsurface layer. If cultivated, both layers are mixed into the plow layer.

This soil can be used for crops if it is protected from erosion. Limitations on the use of heavy implements are moderate.

Slope is the main limitation affecting nonfarm uses of this soil. (Capability unit IIIe–2; woodland suitability group 6)

Collamer Series

In the Collamer series are deep, moderately well drained, medium-textured soils that formed in lake deposits. These deposits are stone free and consist of silt and very fine sand. Collamer soils are extensive in the northern half of the county. A smaller acreage is in the larger valleys to the south.

The surface layer is very dark grayish-brown silt loam 8 to 10 inches thick. This layer contains 3 to 5 percent organic matter. It is porous, is easily penetrated by roots, and has high water-holding capacity. It has a moderate supply of nitrogen, potassium, and phosphorus. Unless limed, the layer is moderately acid.

The subsurface layer is a leached layer of brown silt loam that contains a few faint mottles. The mottling is a result of periodic wetness, but the dominantly brown color indicates that aeration is good most of the time. This layer is permeable to water and roots, and it has moderately high water-holding capacity. It is moderately acid and has a poor supply of potassium and phosphorus. It extends to a depth of 14 to 18 inches.

The subsoil extends to a depth of 24 to 40 inches. It is a zone of clay accumulation and consists of brown or reddish-brown heavy silt loam or silty clay loam. Here, mottles increase in number from few to many with increasing depth. This shows that the upper part of the layer is aerated for longer periods than the lower part. The layer is slightly acid or neutral, contains a moderate supply of potassium and phosphorus, and has high water-holding capacity.

Underlying the subsoil are layers of brown, grayish-brown, or reddish-brown silt loam that alternate with layers of very fine sand. Water moves slowly through this calcareous material, and few roots penetrate it.

Because the Collamer soils formed in layered deposits of variable texture, their horizons vary widely in texture from spot to spot within the same field. Layers of very fine sandy loam are conspicuous in some places.

After each rain in April, free water stands within 10 inches of the surface for a short time. During this month, 4 to 6 consecutive drying days are needed before the soil can be plowed. In May, the soil is saturated at a depth of 15 inches for short periods, but the water recedes quickly between rains. During this month, 3 or 4 consecutive drying days are generally needed before the soil can be cultivated.

The main root zone in Collamer soils is confined to the topmost 18 to 24 inches. This volume of soil can hold between 3½ and 5 inches of water available to plants.

Collamer silt loam, 2 to 6 percent slopes (ClB).—This gently sloping soil is wet for short periods early in spring. It occupies undulating plains that rise slightly above the

wetter landscape. It also occupies foot slopes of higher knolls. Included with this soil, in drainageways on the undulating plains, are small areas of somewhat poorly drained Niagara soils. These are commonly indicated by a wet-spot symbol on the soil map. Also included, where sandy bands are dominant in the profile, are small areas of Galen soils.

This soil is suited to many kinds of crops. It can be used for truck crops, but it is better suited to field crops because it has higher reserve fertility and is more difficult to prepare as a seedbed than the more sandy soils that are used mainly for vegetables. Excess water can be removed by tiling in the drainageways and the included wet spots. Except in the included sandy spots, the tile lines do not need wrapping.

Nonfarm uses are limited mainly by wetness and by instability of the substratum. This soil also is subject to piping. (Capability unit IIe–5; woodland suitability group 1)

Colonie Series

The Colonie series consists of deep, coarse-textured, well-drained to excessively drained soils that formed in sandy lake deposits. These soils are droughty and strongly acid; they occupy deltas formed where sand was dropped as streams entered glacial lakes. Slopes are gentle or moderate and convex. The largest acreage of Colonie soils is in the Oak Orchard Creek basin, and smaller areas are along other major streams in the northern half of the county.

The surface layer in cultivated fields is dark grayish-brown loamy fine sand that generally ranges from 4 to 10 inches in thickness. This layer is porous and permits good root development, but it contains only 1 to 3 percent organic matter and has moderately low water-holding capacity. In unlimed areas the layer is strongly acid. It is low in potassium and phosphorus reserves and has a moderately low content of nitrogen.

The subsoil is yellowish-brown loamy fine sand that extends to a depth of 40 to 70 inches. Its bright color indicates that the layer is well aerated. This layer is excellent for root growth, but it can store only a moderate amount of water. The lower part contains discontinuous bands of slightly finer textured material that may be a little more firm than the material between the bands. The subsoil is low in content of nutrients and is strongly acid.

The grayish-brown to pale-brown substratum is 10 to 60 feet thick and generally is underlain by contrasting unconsolidated material. It consists mainly of fine sand and loamy fine sand that occur in layers. In some places there are bands of medium or coarse sand. The substratum is slightly acid. Water moves through it rather rapidly.

The Colonie soils are saturated only during heavy rainfall in spring, and they quickly dry out. Consequently, in midsummer most crops show signs of wilting after only a few rainless days. Alfalfa and other deep-rooted crops are suited to these soils.

Although natural fertility is low, crops respond to fertilization. The capacity of the surface layer to absorb nutrients and lime is among the lowest in the county. On the stronger slopes, these soils are erodible.

Colonie loamy fine sand, 2 to 6 percent slopes (CmB).—This soil is on nearly level to gently convex slopes that receive no runoff from adjoining soils. It occurs on sandy dunes that rise distinctly above the surrounding landscape. Included with it, near the base of the dunes, are small areas of Elnora soils. Also included, in places where bands of finer textured material are more evident in the subsoil, are small areas of Arkport soils.

This soil is suited to most crops and to pasture and woodland. Crops respond well to lime and fertilizer, but the soil is more droughty than associated Arkport soils. Supplemental irrigation is needed for row crops at some time during a normal growing season. Special market crops, such as potatoes, sweet corn, and tomatoes, do well if they are irrigated. Tender crops can be damaged by windblown sand, however, especially before they are well established and of any size.

This soil has few limitations for nonfarm uses. (Capability unit IIIs–2; woodland suitability group 7)

Colonie loamy fine sand, 6 to 12 percent slopes (CmC).—This gently sloping and moderately sloping soil occupies sandy dunes that rise above the rest of the landscape. Included with it, near the base of the dunes, are small areas of Elnora soils. Also included, in places where bands of finer textured materials are more significant in the subsoil, are small areas of Arkport soils.

Although most crops grown locally are suited to this soil, supplemental irrigation is needed within a short time after a rain. Deep-rooted legumes do well if sufficient lime is added, but soil blowing is a severe hazard. Limitations on the use of large equipment are moderate. The wheels of tractors pulling heavy implements are easily buried. For these reasons, most areas of this soil are wooded or idle.

Soil blowing and droughtiness limit nonfarm uses of this soil. (Capability unit IVs–2; woodland suitability group 7)

Conesus Series

The Conesus series consists of deep, medium-textured, moderately well drained soils that formed in grayish, moderately calcareous glacial till. These nearly level to gently rolling soils occupy areas in which there is little accumulation of runoff from adjacent soils, but they receive enough water to keep them saturated for significant periods.

The surface layer is very dark grayish-brown silt loam that generally ranges from 6 to 11 inches in thickness and that contains 3 to 6 percent organic matter. This layer is porous and well aerated. It is moderately acid in unlimed areas, and it has a moderate capacity to supply phosphorus and potassium.

The subsurface layer is porous, yellowish-brown or brown, faintly mottled loam or silt loam. This leached layer is medium acid and has a low to moderate capacity to supply phosphorus and potassium. It extends to a depth of 16 to 20 inches. The mottles are only in the lower part and indicate that this part is saturated some of the time.

The dark-brown to brown subsoil contains more clay than the layers above or below it. In most places it is heavy silt loam. In the lower part it is firm. This layer

is mottled, which indicates periodic wetness. It is slightly acid or neutral. The potassium reserve is greater than that in other layers, because the clay content is higher, but the phosphorus-supplying power is only moderate. This layer extends to a depth of 30 to 42 inches.

Underlying the subsoil, at an average depth of about 36 inches, is calcareous glacial till consisting of firm, grayish-brown gravelly loam or silt loam. This slowly permeable material is a major reason for the moderate wetness of Conesus soils. The lime content is moderate, and, though potassium and phosphorus are in moderate supply, few roots can use them. The till overlies bedrock at a depth ranging from $3\frac{1}{2}$ to 20 feet.

These soils are saturated when frost leaves the ground in spring. During April, free water stands within 6 inches of the surface during a soaking rain, but it falls to a depth of nearly 30 inches in dry periods. During this month, 4 to 6 consecutive drying days are usually needed before the soil can be plowed. In May, free water normally stands at a depth of less than 18 inches for only short periods, and 3 or 4 consecutive drying days are needed before plowing. In June, 1 or 2 days are sufficient.

The Conesus soils can hold between 3 and 4 inches of available moisture. They respond to liming and fertilization.

Conesus silt loam, 0 to 3 percent slopes (CoA).—This nearly level soil receives little runoff from adjacent soils. It has a surface layer that is darker and thicker than the one described for the series. Included with this soil are small depressional spots of somewhat poorly drained Appleton soils. If spots of Appleton soils occur in a field of this Conesus soil, they determine the earliest date in spring when the field can be plowed. Also included are small knolls of well-drained Lansing soils. In places having a thin leached layer in the subsoil and containing free lime at a depth of less than 20 inches, small areas of Lima soils are included.

Crops, pasture, and trees are well suited to this soil, but maintaining fertility and improving drainage are concerns of management. Some areas, especially inclusions of Appleton soils, can be drained by random tiling. Potentially, the soil is highly productive.

Seasonal wetness and reduced permeability are limitations affecting nonfarm uses of this soil. (Capability unit IIw–2; woodland suitability group 3)

Conesus silt loam, 3 to 8 percent slopes (CoB).—This gently sloping soil is typical of the Conesus series. In most places the upper part of the subsoil is unmottled or only faintly mottled to a depth of 12 to 16 inches. The soil commonly occupies the middle or highest part of broadly undulating areas, where slopes range from short and slightly convex to long and uniform. In these areas some runoff is received from higher soils, but much of it continues on.

Included with this soil are small knolls consisting of Lansing soils. Also included, in places where the profile shows a thin leached layer, are small areas of Lima soils. The included soils are naturally more fertile than this Conesus soil.

Crops, pasture, and trees are well suited to this soil. Cash crops, including dry beans, do well. Limitations on the use of equipment are slight.

Nonfarm uses of this soil are limited by seasonal wetness and by moderately slow permeability in the subsoil. (Capability unit IIe–4; woodland suitability group 3)

Conesus silt loam, 8 to 15 percent slopes (CoC).—This moderately sloping soil lies between Pavilion and Linden, just north of the Wyoming County line. Slopes vary from slightly concave to long and uniform. Small inclusions of the wetter Appleton soils were mapped in seep spots and along narrow, shallow waterways.

If this soil is protected from erosion, it is well suited to crops, pasture, or woodland. Tiling is commonly needed to drain seep spots. The use of large equipment is limited on the stronger slopes.

Moderate slopes, runoff from higher areas, and moderately slow permeability limit nonfarm uses of this soil. (Capability unit IIIe–6; woodland suitability group 3)

Darien Series

Soils of the Darien series are deep, nearly level to strongly sloping, and somewhat poorly drained or moderately well drained. These soils formed in moderately fine textured glacial till consisting mainly of soft, olive-gray, calcareous shale. They occur throughout the southern part of the county.

The surface layer is very dark grayish-brown silt loam that has a moderately high organic-matter content. This layer is porous to air and water and is a good medium for root growth. It has a moderately high nitrogen reserve, but the nitrogen is released slowly. The supply of phosphorus and potassium is moderate. This layer is 8 to 10 inches thick.

The subsurface layer is grayish-brown heavy silt loam that contains many, distinct, olive-brown and yellowish-brown mottles. This layer has a much lower organic-matter content than the surface layer. The many mottles and the grayish colors indicate that the layer is periodically saturated. As it dries, it is readily penetrated by air and is a fairly good zone for roots. The phosphorus and potassium supplies are low. The layer extends to a depth ranging from 10 to 14 inches. Generally, it is mixed into the plow layer by deep plowing.

The subsoil consists of dark grayish-brown to olive-brown silty clay loam that contains many, distinct, olive and dark yellowish-brown mottles. This material is arranged in blocks, and roots can penetrate between the blocks. Root penetration is restricted, however, during long periods of saturation. The layer has a moderately high content of phosphorus, and it contains a moderately large supply of potassium that is associated with the clay content. It extends to a depth of 24 to 40 inches.

The substratum is calcareous silty clay loam in which there are numerous fragments of shale. Many of these fragments are gray and soft, but some are darker gray and brittle. Shale bedrock normally occurs at a depth of 40 to 74 inches, but in places it is as much as 20 feet below the surface.

In April, free water is at a depth of 4 to 16 inches most of the time. During this month, 5 to 7 consecutive drying days are needed before the soil can be plowed. In May, free water is within 6 inches of the surface during rainy periods, but it falls to a depth of 15 inches or more after

several days of drying. During this month, 3 to 5 consecutive drying days are needed before plowing. In June, 2 or 3 drying days are sufficient.

In the spring, plant roots are confined mainly to the surface layer. As the growing season progresses, however, they extend to a depth of as much as 20 inches. The root zone can hold between 3 and 4 inches of water available to plants. Many areas receive runoff and seepage, and these replenish the supply of moisture. In midsummer, crops generally show a deficiency of moisture after 15 to 20 days without rain.

The surface layer has a moderately high capacity to absorb nutrients and lime, though the lime content in this layer is naturally rather high. Because nitrogen is released slowly, a fertilizer containing nitrogen is needed to avoid a deficiency. The Darien soils are moderately difficult to cultivate, but they are neither so lumpy when dry nor so plastic when wet as the Remsen soils.

Darien silt loam, 0 to 3 percent slopes (DaA).—This nearly level, somewhat poorly drained soil commonly receives some runoff from adjacent, better drained soils. In some places, however, it occupies higher, nearly level areas where runoff, though none is received from other soils, is very slow on this soil. The surface layer and upper subsoil of this soil are thicker than those of other Darien soils in the county. Included in low areas are wet spots; these are indicated by symbol on the soil map. Also included are small areas of Burdett soils, which formed in a mantle of silt, and small areas of the more clayey Remsen soils.

Water-tolerant grasses and legumes do fairly well on this soil, but row crops are poorly suited unless drainage is improved. The soil is fairly productive of row crops, however, if it is drained by tiling. Tile lines are slightly more effective in this soil than they are in the finer textured Remsen soils, but the width of effectiveness is less in this soil than in the coarser textured Appleton and Kendaia soils. In some areas row crops show the effects of waterlogging after a heavy rain in summer.

Nonfarm uses are limited mainly by wetness and slow permeability. (Capability unit IIIw-1; woodland suitability group 16)

Darien silt loam, 3 to 8 percent slopes (DaB).—This gently sloping or undulating soil occurs above steeper Darien soils and below gently sloping or moderately sloping, better drained soils, such as the Nunda or Conesus. In undulating areas its slopes are slightly convex, and small areas of poorly drained Ilion soils are included in drainageways or wet spots. Also included are small areas of clayey Remsen soils and of Burdett soils, which formed in a silty mantle.

Row crops can be grown on this soil, but they do poorly in included wet areas and drainageways. If these inclusions are adequately drained and if proper amounts of fertilizer are applied, crop response is fair to good. Tile lines are more effective in this soil than they are in the finer textured Remsen soils, but they are less effective than in the coarser textured Appleton or Kendaia soils. Suitable legumes grow well. Slope is a slight limitation on the use of heavy equipment.

For nonfarm uses, the major limitations are wetness and slow permeability. (Capability unit IIIw-4; woodland suitability group 16)

Darien silt loam, 8 to 15 percent slopes (DaC).—This moderately sloping soil has a thinner upper subsoil than a typical Darien soil. It lies on the crests of ridges and on side slopes of the dissected plateau. Areas on the plateau are below areas of more mildly sloping Darien soils. Included with this soil are small, moderately eroded areas on the shoulders of slopes. Also included are spots of clayey Remsen soils.

This soil is suited to most crops grown locally. Tile lines can be used to drain seep spots.

Nonfarm uses are limited chiefly by slow permeability, moderate slopes, and wetness in spring. (Capability unit IIIe-5; woodland suitability group 16)

Darien silt loam, 15 to 25 percent slopes (DaD).—This moderately steep, moderately well drained soil occupies side slopes of the dissected plateau. It lies below and adjacent to more mildly sloping Darien soils, and it is above nearly level or gently sloping, poorly drained Ilion soils. The surface layer is mainly heavy silt loam. In fields that have been plowed, the upper subsoil is thin or missing. Included with this soil are spots of clayey Remsen soils.

Row crops can be grown on this soil, but sod crops generally are better suited. Using modern machinery is hazardous because of slope, and the soil holds less moisture available to plants than the more mildly sloping Darien soils.

For nonfarm uses, the major limitations are slow permeability and moderately steep slopes. (Capability unit IVe-3; woodland suitability group 8)

Dunkirk Series

In the Dunkirk series are deep, well-drained, stonefree soils that formed in silty lake deposits. These gently sloping to steep soils occur principally in the Tonawanda Creek basin in the western part of the county.

The surface layer generally consists of dark grayish-brown silt loam that is 6 to 10 inches thick in most plowed areas. It contains about 2 to 4 percent organic matter. It is porous and absorbs water moderately fast. Locally, the layer is very fine sandy loam. In unlimed areas it is moderately acid.

The subsurface layer is pale-brown silt loam that extends to a depth of 14 to 18 inches. This layer is low in organic-matter content and is leached of most nutrients. It is rapidly permeable to air, water, and roots, and in most places it is medium acid or strongly acid. In steeper areas this layer is commonly lacking.

The subsoil is reddish-brown heavy silt loam or silty clay loam. This layer extends to a depth of 26 to 38 inches. It is arranged in well-defined blocks and is readily penetrated by plant roots. It has good water-holding capacity. The layer contains a moderate reserve of potassium and has moderate phosphorus-supplying power, but it is low in nitrogen content. In some places it is faintly mottled in the lower part.

Underlying the subsoil are glacial lake deposits, 5 to 50 feet or more thick, that are dominantly silt but include thin layers of very fine sand spaced a fraction of an inch to several inches apart. This material is moderately slowly permeable to water and is penetrated deeply by only a few roots. It is calcareous at a depth ranging from 30 inches in moderately sloping areas to 42 inches in more

mildly sloping areas. Generally, it is underlain by glacial till or bedrock.

In April, free water rarely stands at a depth of less than 20 inches in the Dunkirk soils. In May, free water rises into the upper part of the soil immediately after a rain, but it recedes rapidly. Roots of legumes grow to a depth of 30 to 40 inches. This volume of soil can hold from 3½ to 5 inches of moisture available to plants.

The Dunkirk soils have a moderate capacity to hold lime and other bases. Their capacity to supply potassium and phosphorus is moderate. Because their particles are of uniform size, these soils are erodible.

Dunkirk silt loam, 2 to 6 percent slopes (DuB).—This gently sloping or gently undulating soil is in areas that receive no runoff from adjacent soils. In most places it occurs on top of dunes consisting of silty material. On the crests of larger dunes, it lies above and adjacent to moderately sloping Dunkirk soils. Included locally are eroded spots, and in these the upper subsoil is thinner than that of typical Dunkirk soils. In undulating areas small inclusions of moderately well drained Collamer soils lie in troughs between the rises. Also included, in places where bands of sandy material are dominant in the subsoil, are small areas of Arkport soils.

This soil is well suited to crops, pasture, or woodland. Crops respond well to lime and fertilizer. In dry years supplemental irrigation generally is needed for truck crops. Limitations on the use of all types of equipment are only slight.

For nonfarm uses, the major limitations are moderately slow permeability in the subsoil and unstable layers in the substratum. (Capability unit IIe-3; woodland suitability group 1)

Dunkirk silt loam, 6 to 12 percent slopes (DuC).—This moderately sloping soil is on the sides of silty dunes, and in places it occupies the sides and tops of smaller knolls. It has a thinner upper subsoil than the one typical for the series. Slopes are generally short. Small included spots are moderately eroded, and small areas of Arkport soils are included in places where bands of sandy material are dominant in the subsoil.

This soil is suited to most crops. Small eroded spots can be made more productive through the liberal use of manure.

Nonfarm uses are limited mainly by moderately slow permeability in the subsoil, unstable layers in the substratum, and moderate slopes. (Capability unit IIIe-3; woodland suitability group 1)

Edwards Series

The Edwards series consists of very poorly drained, neutral to alkaline organic soils that are 12 to 42 inches thick over marl. These soils occur mainly in the area of the Bergen Swamp. Smaller areas are along the edge of the Oak Orchard Swamp and in a few pockets scattered across the northern half of the county.

The muck is black and is made up of the decayed remains of woody plants. Below it is marl, a white granular material that is very friable and highly calcareous. The marl extends to a depth of 3 to 10 feet and is underlain by other material.

Generally, the Edwards soils occur in areas that are unfavorable to drain, and they are better left as woodland or as habitat for wildlife.

Edwards muck (Ed).—This nearly level soil generally occurs in or near the Bergen Swamp. Here, it is covered mainly with trees but also supports cattails and sedges. This area is used as a sanctuary for wildlife, and it likely will not be cleared. A smaller acreage is in the Oak Orchard Swamp and has been cleared for farming. Some fields are now abandoned, however, because the muck has subsided so much and the strong alkalinity adversely affects most crops.

Edwards muck is suitable as habitat for wetland wildlife, and it can be used as a source of marl for land lime.

For nonfarm uses of this soil, the major limitations are wetness and the layer of muck. (Capability unit VIIw-2; woodland suitability group 21)

Eel Series

The Eel series consists of deep, medium-textured, moderately well drained or somewhat poorly drained soils that formed in calcareous material recently deposited on first bottoms along rivers and smaller streams. These soils are mainly along Tonawanda, Black, and Oatka Creeks. They lie adjacent to the well-drained Genesee soil and the poorly drained Wayland soil, both of which formed in alluvial deposits.

The surface layer of Eel soils generally is very dark grayish-brown silt loam that ranges from 7 to 11 inches in thickness and from 4 to 6 percent in organic-matter content. In this layer the total content of nitrogen is moderately high. The layer is very porous. It has a moderate capacity to supply potassium and phosphorus, and normally it is neutral. In small areas the texture is fine sandy loam.

Underlying the surface layer is dark grayish-brown silt loam. Mottles are lacking in the upper part of this material, indicating that this part is not saturated for long periods, but below 15 to 18 inches the number of mottles increases with increasing depth. Although the material is permeable to air and water, it contains much less organic matter and nitrogen than the surface layer. It has moderate potassium- and phosphorus-supplying power, and generally it is nearly neutral, though in places it is weakly calcareous. The material extends to a depth of 30 to 40 inches.

Layers of mottled sand, silt, and gravel make up the substratum. This is very deep in the main valleys but is underlain by bedrock at a 3- to 6-foot depth along some of the side streams. The material varies widely in texture from one place to another. In some areas it is silty to a depth of several feet, but in others sand and gravel are dominant and occur within a depth of 3 feet. Although the substratum ordinarily is porous and permeable to water, in some places it includes slowly permeable layers that contribute to the wetness of Eel soils.

In most areas these soils are subject to flooding early in spring. Free water falls to a depth of about 18 inches in dry periods and rises to within 6 inches of the surface in wet periods. At this time of year, 4 to 6 consecutive drying days are needed before the soil can be plowed. In June, only 1 or 2 drying days are needed.

Plant roots thoroughly penetrate the topmost 18 inches of these soils in spring. As the growing season progresses and the water table falls, roots can penetrate to a depth of 24 to 26 inches. This volume of soil can hold between 4 and 6 inches of water available to plants. Crops show signs of moisture shortage only after a long dry period in midsummer.

Potentially, the Eel soils are highly productive. They have a high capacity to absorb nutrients and lime.

Eel silt loam (Ee).—This nearly level soil occurs on the flood plain of most streams. It lies adjacent to the well-drained Genesee soils, which are on thicker alluvial deposits near the streams. Included with it, along the wetter drainageways, are small areas of Wayland soils.

This soil is suited to crops, pasture, or woodland. It is used mainly for crops grown for dairy cattle. If the soil is row cropped, artificial drainage is needed in the wetter pockets and drainageways. Controlling streambank erosion is necessary in some fields.

Nonfarm uses are limited by the frequency of flooding. (Capability unit IIw–3; woodland suitability group 1)

Elnora Series

The Elnora series consists of nearly level and gently sloping, coarse-textured soils that are deep and moderately well drained. These soils occur in areas that are slightly higher than the surrounding landscape. They occupy only a small total acreage, mainly in the Oak Orchard Creek basin.

The surface layer of these soils is dark grayish-brown loamy fine sand containing 2 to 4 percent organic matter. This layer is porous and permits good root development. It has moderately low water-holding capacity and, in unlimed areas, is strongly acid or medium acid. It contains a moderate supply of nitrogen, but it is low in content of potassium and phosphorus. In most places the surface layer is 6 to 11 inches thick.

The subsoil is yellowish-brown loamy fine sand that extends to a depth of 20 to 40 inches. Its dominantly bright color indicates that the layer is well aerated most of the year. The lower part is mottled, however, and the mottles increase in number with increasing depth. This indicates that the subsoil is waterlogged periodically, though it dries out in summer. The lower part of this layer contains discontinuous bands of material that is slightly firmer than the material between the bands. The subsoil is low in nutrients and is strongly acid.

Layers of mottled pale-brown or grayish-brown fine sand and very fine sand make up most of the substratum. In addition, there are thin bands of very fine sand or medium sand in many places. The substratum is firm and moderately acid. It is underlain by glacial till at a depth ranging from 4 to 10 feet.

After a heavy rain in April, free water stands within 10 inches of the surface for a short time. It falls quickly, however, and during this month only 3 to 5 consecutive drying days are needed before the soil can be plowed. In May, only 2 or 3 drying days are needed.

The main root zone in Elnora soils is the topmost 24 to 30 inches. This zone can hold 2 to 3 inches of water available to plants. In midsummer crops show the effects of moisture deficiency after 6 to 8 days without rain.

The Elnora soils are low in fertility, but crops respond well to fertilization. The capacity of the surface layer to absorb nutrients and lime is moderately low.

Elnora loamy fine sand, 2 to 6 percent slopes (ElB).—This nearly level and gently sloping soil is wet for short periods early in spring. It occupies low, undulating, sandy dunes that rise slightly above the surrounding landscape. Small included areas of well-drained Colonie soils lie on the crest of some of the larger dunes, and small inclusions of Galen soils occur in places where bands of finer textured material are more evident in the subsoil. Also included are small areas of nearly level, somewhat poorly drained Stafford soils.

Most crops are suited to this soil. Truck crops are well suited, but they require supplemental irrigation in most years. Tender crops grown in exposed fields may be damaged by windblown sand. Random tiling in the wetter parts of drainageways is desirable, but tile lines should be wrapped at the joints to keep sand from seeping into the lines. The extent of wrapping needed can be determined by onsite investigation.

Seasonal wetness is the main limitation affecting most nonfarm uses of this soil. (Capability unit IIe–5; woodland suitability group 7)

Fonda Series

In the Fonda series are deep, very poorly drained, high-lime soils that formed in fine-textured material. These soils lie in depressional areas where they receive runoff from surrounding soils.

The surface layer is black silt loam that ranges from 2 to 9 inches in thickness and from 6 to 20 percent in content of organic matter. In many areas it is covered with stone-free silty material that washed from higher soils. This layer is nearly neutral in most places. The total content of nitrogen is high, but the nitrogen is released very slowly. The phosphorus- and potassium-supplying power is moderate. If excess water can be removed, the layer is porous and is excellent for root growth. In undrained areas the roots of most trees and other plants are confined to this layer.

Underlying the surface layer is a subsurface layer of gray silt loam that contains a few distinct mottles. The gray color indicates gleying, or reduction of iron compounds, and is evidence that this layer has been wet much of the time. The layer has a moderately low supply of nutrients and is nearly neutral. It extends to a depth of 10 to 18 inches.

The subsoil is neutral to mildly alkaline, very dark grayish-brown silty clay that extends to a depth of 24 to 36 inches and contains many mottles. This layer can be penetrated by roots only if the soil is artificially drained.

The substratum is glacial till consisting of firm, calcareous silty clay loam. The material contains many fragments of dark, unweathered, calcareous shale. It is underlain by shale bedrock at a depth ranging from 4 to 20 feet.

The water table is at or near the surface throughout April. In May, it falls between rains but usually is within 10 inches of the surface. As the growing season progresses, the water table recedes more quickly after rains and falls to greater depths during dry periods. It rises,

however, after each heavy rain. Consequently, the Fonda soils can rarely support farm machinery until mid-June or July.

These soils are used chiefly for pasture or woodland, and they likely will remain in one use or the other because they are difficult to drain.

Fonda mucky silt loam (Fo).—This nearly level, very poorly drained soil lies in depressional areas that generally remain ponded until early in summer. It has a black surface layer that is considerably higher in organic-matter content than the surface layer of the similar but poorly drained Madalin soils. In the deepest part of the depressional areas, there are spots of shallow muck.

This soil is so wet and so difficult to drain that it is not suited to row crops. Some areas are flooded every spring and remain under water for a long time. Unless their surface is drained, some areas are wet all year. In places the soil can be used for summer pasture.

Flooding and extreme wetness are severe limitations affecting most nonfarm uses of this soil. (Capability unit VIw–1; woodland suitability group 21)

Fredon Series

The Fredon series consists of deep, somewhat poorly drained, medium-textured soils that formed in layered deposits of sand, silt, and gravel. These materials vary widely in proportion from place to place.

The surface layer, normally 6 to 11 inches thick, is very dark grayish-brown gravelly loam. This layer is neutral and contains a moderate amount of organic matter. It has good water-holding capacity and a moderate content of plant nutrients. It is underlain by a subsurface layer of gravelly fine sandy loam 5 to 10 inches thick.

The subsoil is grayish-brown to brown gravelly loam that is distinctly mottled in places that are lighter colored. Some of the soil aggregates are coated with a few small patches of clay. This layer is nearly neutral and extends to a depth of 30 to 40 inches.

The substratum is made up of stratified sandy and gravelly material and, in most places, is calcareous. The depth to till or to bedrock ranges from 10 to 40 feet.

The Fredon soils are saturated when frost leaves the ground in spring. Free water is at a depth of 4 to 15 inches during April. Nevertheless, the soils are rapidly permeable and can be drained by tiling. The normal root zone in these soils is 24 inches thick and can hold between 4 and 6 inches of moisture available to plants.

In Genesee County the Fredon soils were mapped only as part of an undifferentiated unit, Phelps and Fredon gravelly loams, 0 to 3 percent slopes. For a description of this mapping unit, see the Phelps series.

Fremont Series

The Fremont series consists of nearly level to moderately steep, acid soils that are deep and somewhat poorly drained. These soils formed in glacial till. They lie along the Wyoming County line from Linden westward.

The surface layer is dark grayish-brown silt loam 5 to 10 inches thick. This layer contains a few coarse fragments. It is acid, is very friable, and has an organic-matter content of about 2 to 4 percent. The supply of nitrogen, phosphorus, and potassium is moderately low.

The subsoil ranges from silt loam to light silty clay loam. It has a slightly higher clay content in the lower part. This layer is olive brown or olive and contains many prominent mottles. It is strongly acid, and it has a low reserve of phosphorus and a moderately low reserve of potassium. The subsoil extends to a depth of 24 to 40 inches.

The substratum also ranges from silt loam to silty clay loam, but generally it contains more shale fragments than the subsoil. Its color ranges from grayish brown to dark olive brown. The substratum is moderately acid or strongly acid. Shale bedrock occurs at a depth of 3½ to 10 feet.

In April, free water is at a depth of 12 to 24 inches in the Fremont soils. During this month, 5 to 8 consecutive drying days are needed before the soil can be plowed. In May, the depth to free water is seldom less than 24 inches except just after a rain. During this month, 3 to 5 consecutive drying days are needed before plowing. In midsummer, the water table is generally at a great depth.

The Fremont soils have very low natural fertility, and a large acreage is no longer used for the full-time production of crops. Crops respond well to added lime and fertilizer, but management is more difficult on these soils than it is on the similar Marilla soils.

Fremont silt loam, 0 to 3 percent slopes (FrA).—This nearly level soil is not so yellow in the upper subsoil as a typical Fremont soil, especially in fields that have been deeply plowed. In some places it lies above more sloping Fremont soils. Small inclusions of poorly drained Allis soils are in lower and wetter areas. Locally, small areas of Hornell soils are commonly included.

Most crops grown in the county are suited to this soil, but spring planting is delayed longer on this somewhat poorly drained soil than it is on better drained soils nearby. Improved drainage is generally needed in the wetter depressions, though the response to tiling is fair to poor. Potatoes can be grown in areas that are adequately drained. Crops in nearly flat areas are particularly susceptible to water injury during heavy summer showers.

For nonfarm uses, the major limitations are wetness and slow permeability. (Capability unit IIIw–1; woodland suitability group 17)

Fremont silt loam, 3 to 8 percent slopes (FrB).—This gently sloping, acid soil occurs on uplands. In convex areas that receive little runoff, it is better drained than in other areas. Included with it are small areas of the more clayey Hornell soils or the more shaly Marilla soils.

This soil is suited to most crops grown locally. It is the best of the Fremont soils for crops, because excess surface water is removed rapidly enough to prevent inundation but not so rapidly that erosion is a serious hazard. Potatoes do well if management is good. Limitations on the use of equipment are only slight.

For nonfarm uses, slow or very slow permeability and seasonal wetness are the major limitations. (Capability unit IIIw–4; woodland suitability group 17)

Fremont silt loam, 8 to 15 percent slopes (FrC).—This moderately sloping, acid soil is better drained than other soils in the Fremont series. It commonly lies below nearly level or gently sloping Fremont soils. Its surface layer and subsoil are slightly thinner than those typical for the series. In wooded areas the surface layer is underlain

by a thin, highly leached subsurface layer. Included with this soil are small areas of the more clayey Hornell soils and the more shaly Marilla soils.

This soil is suited to most crops grown locally, but it is highly susceptible to erosion. The use of large implements is moderately limited by wetness and slope.

For nonfarm uses, the major limitations are slow permeability, wetness in spring, and slope. (Capability unit IIIe–5; woodland suitability group 17)

Fresh Water Marsh

Fresh water marsh (Fw) consists of areas that are permanently under water a few inches to 3 feet deep. These areas support a growth of sedges or cattails. Most of the acreage is in the Oak Orchard Swamp and is within the boundaries of Federal or State wildlife refuges.

The soil material generally is stratified with layers of sand, silt, and clay. This material has been changed little or none by soil-forming processes. In some places it is covered by a thin layer of mucky material.

Fresh water marsh is poorly suited as habitat for openland and woodland wildlife, but it is well suited as habitat for wetland wildlife. Extreme wetness is the major limitation affecting nonfarm uses. (Capability unit VIIIw–1; woodland suitability group 21)

Galen Series

The Galen series consists of deep, moderately coarse textured, moderately well drained soils that formed in sandy material deposited in glacial lakes. These soils occur principally in the northern half of the county, but a smaller acreage is in the main valleys in the southern half. Thin bands of brown, sticky fine sandy loam are conspicuous in the subsoil.

The surface layer of Galen soils is dark grayish-brown fine sandy loam 6 to 11 inches thick. In cultivated fields this layer contains 2 to 4 percent of organic matter. It is porous, has moderate water-holding capacity, and permits good root development. In most unlimed areas, it is moderately acid. It has a moderately low potassium reserve and moderately low phosphorus-supplying power.

The yellowish-brown subsurface layer is porous very fine sandy loam. This medium acid layer extends to a depth of 14 to 18 inches. It can store only a limited supply of moisture, and its content of available nutrients is low.

The subsoil extends to a depth of 30 to 50 inches and is loose, pale-brown loamy fine sand in which there are bands of firmer, darker brown fine sandy loam. The bands hold moisture and retard the downward movement of water through the soil. This banded zone is mottled in the lower part. It ranges from medium acid to neutral, and the pH generally increases with depth. The supply of phosphorus and potassium is low.

The substratum consists of alternate layers of fine sand, very fine sand, and coarse silt. Contrasting material, such as clay or glacial till, occurs at a depth ranging from 4 to 8 feet.

After each rain in April, free water stands within 8 inches of the surface for a short time. It falls quickly in dry periods, however, and at times is more than 30 inches below the surface. In April, 4 to 6 consecutive drying days are needed before the soil can be cultivated. During May, 2 or 3 drying days are needed, but in June only 1 or 2 days are needed.

The main root zone in Galen soils is confined to the topmost 24 to 30 inches. This volume of soil can hold 2½ to 3½ inches of water available to plants.

The Galen soils are moderately low in fertility, but crops respond well to fertilization.

Galen and Minoa very fine sandy loams, 0 to 2 percent slopes (GmA).—These nearly level soils were mapped together as an undifferentiated unit. Almost 60 percent of the total acreage is Galen very fine sandy loam, almost 40 percent is Minoa very fine sandy loam, and the rest is small areas of other soils included in mapping. Any given area may consist entirely of the moderately well drained Galen soil or the somewhat poorly drained Minoa soil. In most areas, however, the two soils occur together, and in these areas the Minoa is below the Galen and is adjacent to the poorly drained Lamson soils.

Small inclusions of Collamer or Niagara soils were mapped in places where silty bands are dominant in the subsoil. Also included are small areas of wetter or drier soils.

If the soils in this unit are drained, they are suited to many kinds of crops. They are excellent soils for truck crops because in dry periods they hold more available moisture than more sloping sandy soils. Drainage can be improved by tiling, but tile lines need wrapping in some areas. The need for wrapping should be determined by onsite investigation. Fields containing both soils are ready for tillage when the Minoa soil is dry enough.

Nonfarm uses are limited by wetness and by sand that is unstable when waterlogged. (Capability unit IIw–1; woodland suitability group 10)

Galen very fine sandy loam, 2 to 6 percent slopes (GnB).—This gently sloping soil is wet for short periods early in spring. It occupies undulating sandy plains that rise slightly above the surrounding landscape, and it also occurs on foot slopes of higher sandy knolls. Small included areas occupy high spots on the undulating plains. Also included, in places where silty bands are dominant in the profile, are small areas of Collamer soils. Small inclusions of somewhat poorly drained Minoa soils lie in drainageways and commonly are shown by symbol on the soil map.

Many kinds of crops are suited to this soil. They respond well to good management, but in dry weather they show signs of moisture deficiency sooner on this soil than on the nearly level Galen soil. The use of heavy implements is slightly limited, mainly in the more sloping areas and in included wet spots.

Seasonal wetness and instability of saturated sand in the substratum are the major limitations affecting nonfarm uses. (Capability unit IIe–5; woodland suitability group 1)

Genesee Series

The Genesee series consists of deep, nearly level, well-drained, medium-textured soils that formed in material deposited by overflowing streams. These soils contain an accumulation of organic matter in the surface layer, but otherwise the deposits have been changed little or none by soil-forming processes. Genesee soils are on the flood

plains of Tonawanda, Oatka, and Black Creeks, and they are subject to flooding in spring. They typically occupy the highest parts of the flood plains, commonly near the streams, where the overflow deposits are thickest.

The surface layer is very dark grayish-brown silt loam 7 to 10 inches thick. This layer contains 4 to 6 percent organic matter. It is porous, permeable to water, and well aerated. In most areas it is nearly neutral. It has a moderate capacity to supply potassium and phosphorus.

Underlying the surface layer is dark grayish-brown silt loam to very fine sandy loam that extends to a depth ranging from 24 to 40 inches. Below this material are layers of silt loam, fine sandy loam, gravel, and sand. This part of the profile is neutral or weakly calcareous. In some areas there is free water at the level of the adjacent stream.

When streams are overflowing very early in spring, the Genesee soils are usually flooded. By April of most years, free water is within 20 inches of the surface for only short periods after rainfall. During April, 3 to 5 consecutive drying days are needed before the soil can be plowed. In May, 2 or 3 drying days are sufficient, and in June only 1 or 2 days are needed. Rarely are Genesee soils flooded during the growing season.

The main root zone for deep-rooted crops is the topmost 40 inches. This volume of soil can hold 6 to 8 inches of moisture available to plants. Consequently, these soils are the least droughty of the well-drained soils in the county.

Genesee silt loam (Gs).—This nearly level, well-drained soil lies on flood plains, generally next to the main stream. Included with it are small spots of the wetter Eel silt loam.

Genesee silt loam is well suited to most crops. Normally, it is more productive than well-drained soils on nearby terraces and uplands. Stream cutting occurs in some areas, and special structures may be needed for protecting the streambanks.

Nonfarm uses of this soil are limited because flooding is a hazard. (Capability unit I–1; woodland suitability group 1)

Halsey Series

The Halsey series consists of deep, poorly drained or very poorly drained soils that formed in poorly sorted glacial outwash. These soils lie in low, wet or seepy areas. They are slightly acid or neutral in the upper part but are calcareous in the substratum. Layers of gravel and sand are dominant in the profile, though layers of silt also occur.

The surface layer in these soils is very dark brown to very dark gray silt loam that contains 5 to 10 percent organic matter. This layer generally is 8 to 10 inches thick, but it is as much as 15 inches thick in areas that have been covered with silty material washed from higher soils. The surface layer is porous, has a moderate capacity to supply potassium and phosphorus, and has a high content of total nitrogen.

Below the surface layer is a thin subsurface layer of grayish-brown gravelly sandy loam. It is neutral and very friable.

The subsoil is brown gravelly sandy loam that extends to a depth of 14 to 18 inches. This layer is saturated except in dry periods of midsummer. When it is not saturated, it is penetrated by roots and water. In contrast to the surface layer, the subsoil contains little organic matter. It has moderate potassium- and phosphorus-supplying capacity. In most places it is neutral or slightly acid.

The upper part of the substratum is dark grayish-brown gravelly sandy loam to gravelly heavy loam. This layer extends to a depth of 20 to 40 inches. Its grayish color indicates that the layer is saturated most of the year. Roots are few in undrained areas. The supply of potassium and phosphorus is medium.

Layers of dark grayish-brown, calcareous gravel, sand, and silt make up the substratum. These layers are of varying thickness and are underlain by firm glacial till or other slowly permeable material at a depth ranging from 3 to 8 feet. Bedrock normally occurs at a great depth.

Throughout April, free water is within 6 inches of the surface in these soils. In May, free water rises to the surface after a rain but falls to a depth of 20 inches or more during rainless periods.

The Halsey soils have a relatively high content of available nutrients, and generally they need little added lime. Unless suitable outlets can be found, the soils are difficult to drain, but once drained they are potentially productive.

Halsey silt loam, 0 to 4 percent slopes (HaA).—This soil is in low areas that remain wet for a long period in spring. Contributing to this wetness is surface runoff or seepage from higher areas. Sandy spots of Lamson soil are the most common inclusions.

Undrained areas of this Halsey soil can be used for forage crops or as woodland. If drained, the soil is suited to many kinds of row crops and can be used intensively. A good way to improve drainage is by tiling, but outlets are difficult to establish in some places. In the more sandy spots, tile lines should be wrapped to keep sand from filtering into them.

For nonfarm uses of this soil, prolonged wetness is the major limitation. (Capability unit IVw–1; woodland suitability group 20)

Hilton Series

The Hilton series consists of nearly level and gently sloping, medium-textured soils that are deep and moderately well drained. These soils formed in moderately calcareous, reddish glacial till derived from limestone, sandstone, and shale. In unlimed areas they are medium acid in the uppermost 18 inches, but they are neutral to calcareous in the lower part of the subsoil. The Hilton soils occur mainly in the northern half of the county. They receive a moderate amount of runoff from higher soils, and they retain enough water to stay wet for a longer time than the similar but well-drained Ontario soils.

The surface layer is dark grayish-brown loam that ranges from 7 to 11 inches in thickness and has a moderately high organic-matter content. It is porous and well aerated, and it has a moderate capacity to supply potassium and phosphorus.

The subsurface layer is brown to pale-brown loam that extends to a depth of 12 to 18 inches. Although it contains a few mottles, this layer is porous, well aerated, and good

physically for plant roots. It is medium acid and has a moderate capacity to supply potassium and phosphorus.

The subsoil is reddish-brown clay loam or heavy loam containing a few pebbles. It extends to a depth of 30 to 42 inches. The upper part of this layer is unsaturated most of the time and is marked with only a few faint mottles, but the lower part is wet for longer periods and shows more distinct mottling. Although the layer contains more clay than the layers above or below it, the blocky arrangement of the material allows water and roots to penetrate fairly well. The layer is slightly acid or neutral in the upper part and is neutral or weakly calcareous in the lower part. It has moderate phosphorus- and potassium-supplying power.

The substratum is 30 to 42 inches below the surface but lies at an average depth of about 3 feet. The material is glacial till consisting of calcareous gravelly loam. It is firm and has moderately slow permeability. It is underlain by bedrock at a depth ranging from 4 to 25 feet.

When frost leaves the ground in spring, many areas of Hilton soils are saturated. In April, free water is within 10 inches of the surface during heavy rains, but it falls to a depth of 30 inches in dry periods. During April, 4 to 6 consecutive drying days are needed before the soil can be plowed. In May, 3 or 4 consecutive drying days are needed before plowing. In June, free water may occur above the firm glacial till, but it rarely stands within a depth of 2 feet for a significant length of time. During this month, only 1 or 2 drying days are needed.

Most deep-rooted crops extend their roots into the clayey lower subsoil. This volume of soil can hold between 4 and 6 inches of moisture available to plants. At the height of the growing season, crops begin to show moisture stress after 12 to 15 days without rain.

The Hilton soils are moderately supplied with plant nutrients and are among the most productive soils in the county.

Hilton loam, 0 to 3 percent slopes (HlA).—This nearly level soil occupies areas that receive little runoff from nearby slopes. It generally occurs on the upper part of low ridges and adjacent to depressions. In areas of this soil in the northeastern part of the county, the subsoil and substratum contain large stones or boulders, most of which are hard red sandstone or dolomitic limestone.

Small areas of Lima soils are included in places where a leached upper subsoil is lacking and where free lime is present at a depth of less than 30 inches. Also included, along drainageways and on slightly lower adjacent slopes, are small areas of somewhat poorly drained Appleton soils.

This soil is well suited to almost all crops grown in the county, and it is a good soil for pasture and woodland. Wetness limits the use of heavy equipment for short periods in spring. Improved drainage promotes the growth of deep-rooted crops and facilitates planting early in spring.

Nonfarm uses of this soil are limited by wetness in spring and by moderately slow permeability in the substratum. (Capability unit IIw-2; woodland suitability group 3)

Hilton loam, 3 to 8 percent slopes (HlB).—This gently sloping, moderately well drained soil receives seepage from higher soils. Areas in the northeastern part of the county have large stones or boulders in the subsoil and substratum. Small inclusions of Lima soils occupy the crests of undulations, where the leached upper subsoil is thin or has been mixed into the plow layer and where free lime is closer to the surface than 30 inches. Also included, in narrow strips along shallow waterways, are small depressional areas of somewhat poorly drained Appleton soils.

This soil is suited to all the common crops, including vegetable crops and those in support of dairying, but erosion is a hazard in cultivated fields. Tile drains installed in drainageways or wet spots allow planting of crops earlier in spring. The use of large, topheavy machinery is slightly limited because of slope.

For nonfarm uses of this soil, wetness early in spring and moderately slow permeability in the substratum are moderate limitations. (Capability unit IIe-4; woodland suitability group 3)

Holly Series

The Holly series consists of nearly level, medium-textured, acid soils that lie on flood plains along the smaller streams draining the acid shaly till areas in the southern part of the county. These soils generally are poorly drained, but in places they are somewhat poorly drained. They are flooded annually and remain wet for a long time in spring.

The surface layer is very dark grayish-brown silt loam that ranges from 4 to 10 inches in thickness and has a high content of organic matter. This layer is friable and is strongly acid. It contains a moderate supply of nitrogen, potassium, and phosphorus.

Underlying the surface layer is dark grayish-brown silt loam that is distinctly mottled. This layer is similar to the surface layer in reaction and nutrient supply, but it has a slightly lower content of organic matter. It is underlain mainly by shaly acid till but also by stratified sand and gravel. Bedrock occurs at a depth of 4 to 10 feet. In most places the bedrock is hard shale.

After the Holly soils are flooded each spring, water is at or near the surface until the stream returns to its normal level. Then, free water is at a depth of 20 to 36 inches for most of the remaining year. The water table seldom falls below this depth, even in dry summers. The hazard of flooding seriously limits the use of Holly soils.

Holly silt loam (Hm).—This acid, alluvial soil occurs along tributary streams that drain the southern part of the county. The soil remains wet for a considerable time after flooding in spring. It is loamy and stone free to a depth of 3 feet and is underlain by various materials, including shale bedrock in a few places. Small inclusions of moderately well drained Middlebury soils lie along the stream channels.

Holly silt loam is so wet and so likely to be flooded that it is not suited to row crops. It is suited to adapted pasture plants and to trees.

The hazard of flooding is the most important limitation that affects nonfarm uses of this soil. (Capability unit IVw-3; woodland suitability group 20)

Honeoye Series, Moderately Deep Variant

The Honeoye series, moderately deep variant, consists of well-drained, medium-textured soils that are high in lime content. These soils generally are moderately deep over rock. They occur mainly near the Onondaga limestone escarpment, where the glacial till contains a large amount of limestone. Most of the acreage is in the towns of Le Roy, Stafford, and Batavia.

The surface layer in cultivated fields is dark grayish-brown or very dark grayish-brown silt loam 6 to 11 inches thick. It is nearly neutral, is very friable, and has a moderate content of organic matter. The supply of nitrogen, potassium, and phosphorus is moderate. In wooded areas the original surface layer is only 3 or 4 inches thick and is underlain by a thin, leached subsurface layer. These two are mixed if the soil is plowed.

The brown subsoil generally is heavy silt loam or light silty clay loam. This layer is neutral or mildly alkaline and has a moderate supply of potassium and phosphorus. It extends to a depth of 18 to 30 inches.

The substratum is calcareous loam or silt loam glacial till that contains more fragments of limestone than the layers above it. Limestone bedrock occurs at a depth of 20 to 40 inches.

After frost leaves the ground in spring, these soils are saturated for only short periods. In April, 2 or 3 consecutive drying days are needed before plowing. In May, generally only 1 day is needed. The level of free water falls rapidly, or the water moves quickly into limestone crevices that underlie the thin substratum. In summer the water table is generally at a great depth.

These soils can hold less water available for plants than deeper soils. If rainfall is adequate, however, peas and other early season crops do well. Their productivity is not appreciably lower than that of the same crops grown on the Ontario or Lima soils.

Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes (HnB).—This nearly level and gently sloping, well-drained soil has a high content of lime. In some places limestone crops out. Small included areas are deeper than 3 feet. Also included are small areas of moderately deep Lima and Kendaia soils, which are not so well drained as this soil, and small areas of shallow Benson soils.

Almost all crops grown locally are well suited to this soil. Growth of alfalfa is good, especially the early cuttings. The soil can be tilled early in spring, and it is excellent for early peas and cabbage.

For nonfarm uses of this soil, the major limitation is limestone bedrock within 20 to 40 inches of the surface. (Capability unit IIe–1; woodland suitability group 5)

Hornell Series

The Hornell series consists of gently sloping to steep, deep and moderately deep soils that are moderately well drained or somewhat poorly drained. These clayey, acid soils formed in shaly glacial till, and they are underlain by soft shale. They occur in the southern part of the county from Bethany Center westward to the Erie County line.

In Genesee County these soils generally are eroded and have a 5- to 9-inch surface layer of dark grayish-brown silty clay loam. This layer is acid and friable to firm, and it contains 2 to 4 percent organic matter. It has a medium supply of potassium and a moderately low supply of nitrogen and phosphorus. In small uneroded areas, the surface layer is silt loam.

The subsoil ranges from silty clay loam to clay, and commonly it is finest textured in the lower part. The subsoil is prominently mottled throughout. It is generally pale brown in the upper part but is dominantly gray in the lower part. In uneroded areas the upper subsoil includes a faintly mottled yellowish-brown layer. The subsoil has well-defined blocky structure that permits roots and water to move readily. It is strongly acid, and it has a low reserve of phosphorus and a moderate reserve of potassium. It extends to a depth of 20 to 40 inches.

Typically, the substratum is glacial till consisting of shaly silt loam. It ranges from gray to olive in color and is moderately acid or strongly acid. The depth to shale bedrock ranges from 20 to 40 inches.

In April, free water is normally at a depth of 12 to 24 inches. After 5 to 8 consecutive drying days, the water table has fallen far enough that the soil can be plowed. In May, free water is seldom within 24 inches of the surface. Immediately after a heavy rain, however, 3 to 6 consecutive drying days are needed before plowing. In midsummer the water table is generally at a great depth.

The natural fertility of these soils is very low. A moderate amount of potassium occurs deep in the subsoil, but the potassium is slowly available. The amount of moisture available to plants is generally low. Between midsummer and fall, crops are affected by insufficient moisture after 10 to 14 days without rain.

Hornell silty clay loam, 3 to 8 percent slopes, eroded (HoB3).—This gently sloping, acid soil is moderately eroded. Small included areas are uneroded or are covered with material that washed from other soils. Also included, on convex upper slopes, are small areas of other moderately well drained soils. Small inclusions of poorly drained Allis soils lie in flat or depressional areas.

This soil is suited to cultivated crops, pasture, or woodland. In cultivated fields, however, the surface layer generally is in poor tilth.

Very slow permeability is the major limitation affecting nonfarm uses of this soil. (Capability unit IIIe–8; woodland suitability group 18)

Hornell silty clay loam, 8 to 15 percent slopes, eroded (HoC3).—This moderately sloping, acid soil occupies eroded uplands. Its plow layer is clayey and cloddy, and it is underlain by a gray subsoil. Drainage is moderately good in upper convex areas, but it is somewhat poor in lower areas that receive a considerable amount of runoff from higher soils. Small uneroded areas are included where the surface has been protected by trees or by suitable practices in cultivated fields. In these inclusions the soil has a friable surface layer and a friable, yellowish upper subsoil.

Row crops can be grown on this soil, but runoff is rapid, and enough moisture can be stored for plants only if intensive practices are used. Limitations on the use of heavy implements are moderate.

Nonfarm uses are limited mainly by slow permeability and moderate slopes. (Capability unit IVe–5; woodland suitability group 18)

Hornell and Fremont soils, 15 to 25 percent slopes, eroded (HsD3).—The soils in this undifferentiated unit are moderately steep and, in most places, are moderately well drained. They formed in acid, shaly glacial till. Any given area mapped as this unit may consist of Hornell soil, of Fremont soil, or some of both. These soils are eroded, and their present surface layer is thinner than the one described for the respective series. The surface layer in the Hornell soil is silty clay loam; that of the Fremont soil is heavy silt loam. Small inclusions are wooded and uneroded; these consist of Hornell soil, Fremont soil, or both, in which a silt loam surface layer is underlain by a thin, highly leached subsurface layer. Also included, principally in association with the Fremont soil, are small areas of Marilla soils.

Both soils in this unit generally are not suited to cultivated crops. Because of slope and the erosion hazard, the soils are better used for hay, pasture, or woodland. For obtaining a good growth of hay, a large amount of lime and a moderate application of fertilizer are needed in most fields. Moderately steep slopes severely limit the use of large farm implements.

For nonfarm uses of these soils, the major limitations are slow permeability and slope. (Capability unit VIe–2; woodland suitability group 17)

Ilion Series

In the Ilion series are deep, poorly drained soils that developed from calcareous glacial till, dominantly gray clayey shale. These soils commonly occupy level or depressional areas.

The surface layer is 8 to 10 inches of silt loam that has a high organic-matter content and is very dark gray. In this layer the nitrogen available for plants is released slowly. The phosphorus and potassium supply is moderate. The layer is nearly neutral.

The subsurface layer is a leached layer of light-gray silt loam that is distinctly mottled with yellowish brown. These mottles, together with the gray color, indicate that the layer is wet for long periods. This layer is slightly acid or neutral, and its nutrient supplies are moderately low.

The subsoil extends to a depth of 20 to 40 inches and is neutral to mildly alkaline, dark grayish-brown silty clay loam. This layer contains many distinct mottles. It has a moderate supply of phosphorus and a high or very high content of potassium that is associated with the moderately high clay content.

The substratum is firm, calcareous silty clay loam glacial till. In this material the amount of dark, weathered shale fragments increases with increasing depth. Roots do not penetrate this layer. Bedrock occurs at a depth ranging from 40 inches to 20 feet.

During April, the Ilion soils are saturated to the surface most of the time. In May, the water table falls to a depth of 10 to 15 inches, and in May, it is normally at a depth of 18 to 25 inches. Only in drier years can these soils be plowed before July.

Generally, the Ilion soils are suited only to plants grown for hay, but they can be used for water-tolerant crops if the surface is drained. Tile drains are suitable but are less effective than in coarser textured soils.

Ilion silt loam, 0 to 3 percent slopes (IoA).—This poorly drained soil is in low, flat or depressional areas that receive runoff from higher areas of Darien, Burdett, Remsen, or Manheim soils. In some areas it is covered by as much as 1 foot of material that washed from surrounding soils. In places where it occurs near the Manheim soils, it has a more shaly substratum than typical Ilion soils. Included with this soil, in the deeper depressions, are small areas of very poorly drained Alden or Fonda soils.

Undrained, this soil is too wet for most crops except suitable grasses, legumes, and trees. The response to tiling is better than in Madalin soils, but it is not so good as in the Lyons soils. In some places outlets for tile lines are difficult to establish. Even after drainage is improved, row crops are subject to ponding during a heavy rain in summer, for water moving downward through the soil is retarded by slowly permeable layers.

Nonfarm uses are limited mainly by wetness and slow permeability. (Capability unit IVw 2; woodland suitability group 20)

Ilion silt loam, 3 to 8 percent slopes (IoB).—This gently sloping, poorly drained soil occupies concave areas that resemble inverted fans facing uphill. The areas are broadest near the top and are narrowest at the base. They lie below long areas of sloping, better drained soils, generally the Darien or Remsen, that contribute a large amount of runoff. Excess water from these higher soils is carried in braided drainageways that cross this soil and come together at the base of the fanlike areas. Small higher spots of Darien soils were included in mapping.

Undrained, this soil can be used for hay, pasture, or woodland. Although draining by use of tile is generally not feasible, the amount of runoff received from other soils can be reduced in diversion ditches that are properly located. Suitable legumes produce satisfactory crops of hay, but row crops are not suitable unless the surface is well protected from runoff. About half the acreage of this soil is now wooded.

Nonfarm uses are limited chiefly by wetness, accumulating runoff, and slow permeability. (Capability unit IVw–2; woodland suitability group 20)

Kendaia Series

The Kendaia series consists of deep, nearly level, medium-textured soils that are somewhat poorly drained. These soils formed in high-lime glacial till, and they occupy areas that collect runoff from higher soils.

The surface layer is very dark grayish-brown silt loam, generally 7 to 10 inches thick. This layer contains 5 to 8 percent organic matter. It is porous, has crumb structure, and contains a few pebbles. The layer is nearly neutral and has moderate potassium- and phosphorus-supplying power. In many areas the original surface layer is covered with material of considerable thickness that washed from adjacent soils.

The subsoil extends to a depth of 15 to 30 inches and consists of brown, distinctly mottled silt loam to light silty clay loam. The mottling indicates that the layer is alternately wet and dry. This layer is neutral or slightly calcareous, and in some areas it contains free lime in the lower part. Although the subsoil is physically permeable, periodic wetness restricts penetration of roots and water. The reserve of potassium is medium to high, and that of

phosphorus, medium. In unplowed areas the subsoil includes a thin, leached, mottled layer in the upper part, but this is generally destroyed by plowing.

Underlying the subsoil is glacial till consisting of strongly calcareous, faintly or distinctly mottled gritty or gravelly loam or silt loam. This material extends to a depth of 40 inches to 40 feet and is underlain by limestone bedrock.

In undrained areas these Kendaia soils have a water table that fluctuates between the depths of 4 and 14 inches during most of April. At this time, 6 to 8 consecutive drying days are needed before the soil can be plowed. In May, the water table rises to within 8 inches of the surface after rains, and 3 to 6 consecutive drying days are needed before plowing. In June, 2 to 4 days are sufficient after a heavy rain. During dry periods of midsummer, the water table is far below the surface. If drought occurs in midsummer, these soils generally can provide more moisture to plants than better drained soils nearby.

The high organic-matter content in these soils indicates that the total content of nitrogen is high, but the organic matter is decomposed slowly, and crops show a deficiency of nitrogen in spring. For optimum productivity, fertilizer that contains potassium and phosphorus is needed. The surface layer has a moderately high capacity to absorb nutrients, and the soils are highly productive if they can be drained.

In Genesee County the normal Kendaia soils were not mapped separately. They were mapped only in an undifferentiated unit, Lyons and Kendaia silt loams, 0 to 3 percent slopes. For a description of this unit, see the Lyons series.

Also mapped in the county were soils of the Kendaia series, moderately deep variant. These soils are similar to normal Kendaia soils in most respects, but they are only 20 to 40 inches deep over limestone bedrock.

Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes (KeA).—This nearly level soil is in areas that receive runoff from surrounding soils. It is 20 to 40 inches deep over bedrock, which lies almost horizontally and is fractured for some depth. If excavated, the rock breaks out in chunks that range from flagstones 1 inch thick to stones 8 inches thick. Small inclusions of moderately deep Lima soils occur in slightly higher, gently sloping areas. In addition, inclusions of poorly drained Lyons soils are in lower spots and in small areas along drainageways.

Some late-planted row crops can be grown on this soil, but sod crops are better suited. The fertilizer needed is about the same as on deep Kendaia soils. Improving drainage is difficult and generally too costly. Because the soil is wet and only moderately deep, large trees on exposed sites may be blown over by strong winds.

Nonfarm uses are severely limited by depth to bedrock and wetness. The bedrock is generally limestone, but in some areas it is shale. (Capability unit IVs-3; woodland suitability group 15)

Lakemont Series

The Lakemont series consists of deep, poorly drained, moderately fine textured and fine textured soils that formed in reddish clay deposited in glacial lakes. These soils occupy flat or slightly depressional areas across the northern half of the county.

The surface layer is very dark brown silty clay loam that ranges from 7 to 10 inches in thickness and from 5 to 8 percent in organic-matter content. Unless artificial drainage is provided, most roots are confined to the surface layer. Although the nitrogen content is high, nitrogen is released very slowly in undrained areas.

The subsurface layer extends to a depth of 12 to 18 inches. It consists of neutral, gray silty clay loam that contains many brown to strong-brown mottles. Its gray color shows that this layer is wet for long periods of time. In undrained areas the only roots that penetrate this layer are those of water-tolerant plants. The content of organic matter is considerably lower than that in the surface layer.

The subsoil is brown to reddish-brown silty clay or clay that extends to a depth of 18 to 36 inches. It is marked with many faint mottles and is slowly permeable. The potassium reserve is large but is nearly unavailable to plants because so few roots penetrate this layer in undrained areas.

The calcareous substratum generally is reddish-brown silty clay loam. In many places, however, it is reddish clay, silt, and very fine sand arranged in layers of varying thickness.

In April, free water stands within 8 inches of the surface. During May, the water table remains near the surface but may fall to a depth of as much as 12 inches. In drained areas some roots grow to a depth of 24 inches.

Because of its high organic-matter content, the surface layer has a very high capacity to absorb bases. Additions of lime are not needed in most areas. Wetness is the main limitation affecting Lakemont soils.

Lakemont silty clay loam (Lc).—This poorly drained, level or nearly level soil is in low areas that receive runoff from higher soils. Included with it, especially in the Oak Orchard Creek basin, are small areas of the less clayey Canandaigua soils and the more poorly drained Fonda soils. In addition, there are spots of Romulus soils included in places where the parent material was red clay mixed with glacial till.

This soil remains wet for a long time in spring, and most of it is pastured, but it is fairly suitable for crops if it is adequately drained. Pasture should not be grazed when the soil is wet and soft.

For nonfarm uses, wetness and slow permeability are the major limitations. (Capability unit IVw-2; woodland suitability group 20)

Lamson Series

The Lamson series consists of poorly drained and very poorly drained, moderately coarse textured soils that formed in lacustrine or eolian deposits, mainly fine and very fine sand. These soils occur mostly in the northern part of the county.

The surface layer is very dark gray very fine sandy loam, generally about 10 inches thick. It is neutral and has an organic-matter content ranging from 4 percent in drained and cultivated areas to 15 percent in the most poorly drained areas. In the wettest areas this layer is mucky and nearly black. The surface layer has a very

high content of total nitrogen, but its potassium reserve is very low. The capacity to supply phosphorus is medium. If drained, this layer is excellent for root development.

The subsurface layer is thin, light gray, and sandy. Its gray color indicates that the layer is waterlogged for long periods. Although a few mottles occur, the layer is less mottled and is more sandy than the lower part of the subsoil. It is neutral and has a low capacity to supply plant nutrients, but in drained areas it is easily penetrated by roots. This layer extends to a depth of 11 to 18 inches.

The subsoil extends to a depth of 24 to 40 inches and consists of layered material. About three-fourths of it is light-gray, distinctly mottled loamy very fine sand, and the rest is grayish-brown very fine sandy loam. This material, especially the very fine sandy loam, is firmer than the layer above. It is neutral or mildly alkaline, and it has a low or very low content of major plant nutrients.

The substratum is faintly mottled grayish brown, and generally it is fine sand or very fine sand, but thin lenses of silt loam or very fine sandy loam occur in some places. This material may be calcareous at a 24- to 40-inch depth. It is very low in potassium and medium to low in phosphorus. Only a few roots reach the substratum unless the soil is adequately drained.

In undrained areas root development is confined mainly to the surface layer. The potassium reserve is low because the soils contain so little clay, and the phosphorus-supplying power is medium.

Normally, undrained areas of Lamson soils cannot support farm machinery until June or July. Although the soils are sandy, droughtiness is not a limitation unless artificial drainage lowers the water table too far.

Lamson very fine sandy loam (Ld).—This poorly drained, level or nearly level soil lies in low areas that receive runoff from higher soils. Locally, small areas of the more silty Canandaigua soils are included.

This soil remains wet for long periods in spring. During April the water table fluctuates between the surface and a depth of 12 inches. In May, it may fall to a 20-inch depth between rains. Crops respond well in fields that are adequately drained. Outlets are difficult to establish in some places, but excess water moves quickly into tile drains that are properly installed. Tile lines in the more sandy spots need wrapping to keep sand from seeping in at the joints. Undrained areas of this soil are suitable for pasture.

Nonfarm uses are limited mainly by wetness and by sand that is unstable when saturated. (Capability unit IVw–1; woodland suitability group 20)

Lamson mucky very fine sandy loam (Le).—This very poorly drained soil is in depressional areas that are ponded until late in spring. In fields that have been cleared and cultivated, the surface layer contains less organic matter than in other areas. This soil lies adjacent to poorly drained Lamson very fine sandy loam, a soil that is included with this one in small areas. Also included, in the lowest part of some depressions, are small spots of shallow muck.

If undrained, this soil is of limited use as summer pasture. Outlets deep enough for tile drains are difficult to establish. But where the soil is properly drained, crops respond well, especially during the drier growing seasons. Some wrapping of tile lines is needed in the more sandy spots.

Nonfarm uses are severely limited by wetness and by unstable saturated sand. Large amounts of fill materials are needed. (Capability unit IVw–4; woodland suitability group 21)

Lansing Series

The Lansing series consists of deep, gently sloping to moderately steep, well-drained soils that formed in moderately calcareous glacial till. The grayish till is a mixture of limestone, shale, and sandstone. Lansing soils occupy distinctly convex areas, mainly in the southeastern corner of the county.

The surface layer, generally 6 to 11 inches thick, is dark grayish-brown silt loam that contains a few pebbles. It has a moderate content of organic matter, and it is porous and well aerated. In unlimed areas it is strongly acid. The potassium- and phosphorus-supplying power is moderate.

The subsurface layer is pale-brown or brown silt loam that extends to a depth of 15 to 20 inches. This layer is porous and has good permeability and aeration. It is medium acid. The capacity to supply potassium and phosphorus is moderate.

The subsoil extends to a depth of 30 to 48 inches and is brown silt loam or light silty clay loam that is arranged in small blocks. Roots can penetrate this material between the blocks. The layer is slightly acid or neutral, has moderate phosphorus-supplying power, and, because of the clay content, has a moderately high potassium reserve.

The substratum begins at a depth ranging from 30 to 48 inches. It is calcareous glacial till consisting of firm, dark grayish-brown gravelly or stony loam that is slowly permeable to water. The depth to bedrock ranges from 4 to 60 feet.

When frost leaves the ground in spring, the Lansing soils are saturated, but they dry quickly. In April, 3 to 6 consecutive drying days are needed before the soil can be plowed. In May, 2 or 3 drying days are needed. After the spring runoff, the water table falls rapidly to a depth of 20 to 40 feet.

These soils are highly productive of most crops. They can supply a moderate amount of plant nutrients.

Lansing silt loam, 3 to 8 percent slopes (LgB).—This gently sloping soil occupies convex slopes that receive no runoff from higher soils. In some places the substratum overlies clay shale and is finer textured than that described for the series. In these places small inclusions of Nunda soils were mapped. Also included, on the longer slopes, were small areas of moderately well drained Conesus soils.

This soil is well suited to crops, pasture, or trees. Under intensive cultivation, the surface layer remains friable if the soil is well managed. Limitations on the use of top-heavy equipment are slight, particularly on the stronger slopes.

Nonfarm uses are limited by slow permeability in the substratum. (Capability unit IIe–1; woodland suitability group 3)

Lansing silt loam, 8 to 15 percent slopes (LgC).—This moderately sloping soil occurs on prominent ridges in the southeastern part of the county. Here, it receives some runoff from gently sloping Lansing soils, which lie on the crests of the ridges. The runoff is quickly removed, however. Included with this soil, in places where the substratum is finer textured than the one typical for the series, are small areas of Nunda soils. Also included are small areas of gravelly Palmyra soils.

Most crops can be grown on this soil. Slope is a moderate limitation on the use of farm machinery, especially the larger implements.

For nonfarm uses, the major limitations are moderate slope and slow permeability in the substratum. (Capability unit IIIe–1; woodland suitability group 3)

Lansing silt loam, 15 to 25 percent slopes (LgD).—This moderately steep soil is on the sides of prominent ridges in the southeastern part of the county. Its upper subsoil is thinner than the one in typical Lansing soils having milder slopes. Locally, small areas of gravelly Palmyra soils are included.

Most crops can be grown on this soil, but the operation of machinery is difficult because of slope. Sod crops generally are better suited than cultivated crops.

Slope is the chief limitation affecting nonfarm uses of this soil. (Capability unit IVe–2; woodland suitability group 3)

Lima Series

In the Lima series are nearly level and gently sloping, deep and moderately deep soils that are medium textured and moderately well drained. These soils formed in high-lime glacial till derived mainly from limestone and shale.

The surface layer is very dark grayish-brown silt loam that generally ranges from 6 to 10 inches in thickness and is 3 to 5 percent organic matter. This porous layer is well aerated. It is easily penetrated by roots and serves as a good seedbed. It is slightly acid or neutral, has a moderately high content of nitrogen, and has a moderate capacity to supply phosphorus and potassium to plants.

The brown or dark-brown subsoil is silt loam or light silty clay loam. It extends to a depth of 15 to 30 inches, and its brown color indicates that this layer is well aerated much of the time. It contains yellowish-brown mottles in the lower part, however, and these show that this part is waterlogged periodically. The subsoil is neutral or slightly alkaline, has a moderately high capacity to supply potassium, and has moderate phosphorus-supplying power.

The substratum is glacial till made up of highly calcareous, brown to grayish-brown, mottled loam or silt loam. This material is very dense and slowly permeable. In places it contains many pebbles, cobblestones, and small boulders of limestone. The supply of potassium and phosphorus is moderate. Bedrock, mainly limestone, is at a depth ranging from 20 inches to 30 feet.

The Lima soils are saturated when frost leaves the ground in spring. During April, free water stands within 6 inches of the surface in rainy periods but falls to a depth of more than 24 inches in dry periods. During this month, 4 to 6 consecutive drying days are needed before the soil can be plowed. In May, free water rarely stands within a depth of 16 inches for a long time, and only 3 or 4 drying days are needed before plowing.

For most crops the depth of rooting ranges from 18 to 30 inches. This volume of soil can hold between 3 and 5 inches of water available to plants. During the growing season, crops show signs of inadequate moisture after 10 or 12 days without rain.

Although the total content of nitrogen is fairly high, the nitrogen is released slowly early in spring. Nevertheless, the Lima soils are among the most productive in the county.

Lima silt loam, 0 to 3 percent slopes (LmA).—This nearly level soil generally occupies areas that receive only a little runoff from adjacent slopes. It lies above gently undulating Lima soils, as well as above somewhat poorly drained Kendaia and Appleton soils. Small areas of all these soils were included in mapping.

This soil is well suited to most crops and to pasture and trees. It can be row cropped continuously if adequate amounts of lime and fertilizer are used. After the soil is drained with tile, crops can be planted early in spring and deep-rooted crops such as alfalfa can be grown. The use of heavy equipment is limited for short periods in spring because of wetness.

The main limitations for nonfarm uses are wetness in spring and a slowly permeable substratum. (Capability unit IIw–2; woodland suitability group 5)

Lima silt loam, 3 to 8 percent slopes (LmB).—Although this soil is gently sloping, it is slowly permeable and therefore is wet for short periods in spring. It contains free lime at a lesser depth than the nearly level Lima soils.

Small inclusions of somewhat poorly drained Kendaia soils lie in drainageways that thread between low knolls or rises, and small inclusions of well-drained Honeoye soils commonly cap the knolls. Each of these included soils occupies about 10 percent of the total acreage. Also included, just south of the village of Stafford, are small areas of darker Mohawk soils.

This Lima soil is well suited to crops, pasture, and woodland. Fields can be planted earlier in spring if tile drains are installed in the wetter drainageways. Because of wetness in spring, the use of heavy equipment is limited for short periods. Untiled low spots remain troublesome for a somewhat longer time.

Seasonal wetness and slow permeability are limitations affecting nonfarm uses of this soil. (Capability unit IIe–4; woodland suitability group 5)

Lima silt loam, moderately deep variant, 0 to 3 percent slopes (LnA).—This soil is similar to a normal Lima soil in most respects, but generally it is only 20 to 36 inches deep to bedrock. In some areas it is as shallow as 14 inches over ledges of rock, and about 15 percent of the areas mapped are underlain by bedrock at a depth of less than 20 inches. The rock lies almost horizontally. It is fractured to some depth and, when excavated, breaks into fragments that vary from flagstones 1 inch thick to cake-like chunks 8 inches thick. This nearly level soil receives little runoff from surrounding soils. Included with it, in slightly depressional areas, are small areas of moderately deep Kendaia soils.

This soil can be used for crops, pasture, or woodland. It tends to be more droughty than a deep Lima soil, and

this difference may show in some shallow-rooted crops. In exposed areas large trees may be tipped or uprooted by strong winds. Installing tile drains or open ditches requires blasting of the bedrock in some areas. Consequently, draining wet spots can be difficult, especially if the grade line through a wet spot must be maintained at a great depth.

Generally, wet spots and slow permeability are the main limitations affecting nonfarm uses of this soil. (Capability unit IIIs–5; woodland suitability group 5)

Lima silt loam, moderately deep variant, 3 to 8 percent slopes (LnB).—This gently sloping variant from a normal Lima soil generally is 20 to 36 inches deep over bedrock, though the depth to rock is more variable than in the nearly level variant. Layers of rock crop out in some places, but between the outcrops is soil more than 20 inches deep. Some outcrops and escarpments of bedrock are indicated by symbol on the soil map.

Included with this soil, commonly in the most sloping part along the edge of mapped areas, are very shallow spots. In some areas mapped as this soil, about 15 percent of the acreage is occupied by included small areas of Lima or Honeoye soils that are deeper than 3 feet. In a few places there are small inclusions in which bedrock occurs at a depth of more than 5 feet.

This soil can be used for crops, pasture, or woodland. It is not significantly less productive than normal Lima soils. The root zone is sufficiently deep in most areas, but a few shallow spots are droughty. Large trees on exposed sites may be tipped by strong winds. Installing tile drains in wet areas is difficult because of shallowness to bedrock. North of the Onondaga limestone escarpment, where the underlying bedrock is dominantly soft red shale, the rock can be excavated. But in areas underlain by limestone, blasting generally is required.

Nonfarm uses of this soil are limited mainly by the limited depth to bedrock. Seasonal wetness also is a limitation. (Capability unit IIIs–5; woodland suitability group 5)

Lyons Series

The Lyons series consists of deep, poorly drained soils that formed chiefly in medium- to high-lime glacial till. In most areas the till was covered with stone-free material of variable thickness laid down by water. These soils occupy level and depressional areas that are scattered throughout the county. They lie adjacent to somewhat poorly drained Kendaia and Appleton soils.

The surface layer is very dark gray silt loam that ranges from 6 to 10 inches in thickness and has a high organic-matter content. This layer is nearly neutral in most places, but it is medium acid in some areas in the southeastern part of the county. Although the total content of nitrogen is high, the nitrogen is released very slowly for plants. The phosphorus- and potassium-supplying power is medium. This layer is porous and is excellent for plant roots if excess water can be removed. In undrained areas the roots of most plants are confined to this layer because the subsoil is so wet.

The subsurface layer is mottled, light-gray loam or silt loam that extends to a depth of 12 to 16 inches. Its gray color indicates that the layer is saturated most of the time. This layer is neutral in most places. It is porous, but few roots penetrate it unless drainage is improved.

The subsoil is mottled, brown to dark grayish-brown silt loam that may contain a little more clay than the layers above and below. It extends to a depth of 18 to 30 inches, and its gray mottled colors indicate that the layer is saturated much of the time. This part of the subsoil is neutral or mildly alkaline. It has a medium to high reserve of potassium and a medium reserve of phosphorus. Unless the soil is drained, however, only a few roots reach this layer.

The substratum is dense, calcareous gravelly loam or silt loam that is 5 to 30 feet deep over bedrock. This material has moderately slow permeability, a major reason for the wetness of Lyons soils.

In April, the water table fluctuates between the surface and a depth of 6 inches. In May, the water table falls between rains. It may fall to a depth of 20 inches during dry periods, but it is within 10 inches of the surface most of the time. Consequently, the Lyons soils can rarely support farm machinery before June.

These soils have high natural fertility, and they produce satisfactory crops if they are adequately drained.

Lyons and Appleton silt loams, 0 to 3 percent slopes (LoA).—These nearly level soils occupy areas that receive runoff from adjacent nearly level or gently sloping Hilton or Conesus soils. About 50 percent of the total acreage is poorly drained Lyons silt loam, 35 percent is somewhat poorly drained Appleton silt loam, and 15 percent is small areas of other soils included in mapping.

Any given area may consist of the Lyons soil, the Appleton soil, or both soils in any proportion. Larger areas generally contain both, the Lyons being the more extensive. The Appleton soil occupies the edge of mapped areas, adjacent to the better drained Hilton soils, and it also is in slightly higher areas surrounded by the Lyons soil. Where the soils of this unit are near the Hilton soils, their subsoil is redder than that described as typical for the respective series. Where they are near the Conesus soils, their subsoil is grayer than the one described as typical. Small areas of mucky Alden soils lie in pockets and are included.

The Appleton soil can be used for some kinds of row crops, especially in drier years, but in undrained areas the Lyons soil is better suited to pasture. Both soils can be drained by tiling and, where adequately drained, are more productive than associated soils in which drainage is better. In fields where the two soils occur in an intricate pattern, both can be tilled if the Lyons soil is not too wet. Draining the wetter Lyons soil commonly benefits the Appleton soil also. Consequently, an entire field is ready for tillage when the associated Hilton or Conesus soils are dry enough.

The major limitations for nonfarm uses are wetness and relatively low position in the landscape. (Capability unit IVw–1; woodland suitability group 20)

Lyons and Kendaia silt loams, 0 to 3 percent slopes (LpA).—These deep, nearly level soils occur in areas that receive runoff from higher areas of nearly level or gently sloping Lima soils. About 45 percent of the total acreage is poorly drained Lyons silt loam, 40 percent is somewhat poorly drained Kendaia silt loam, and 15 percent is small pockets of mucky Alden soils included in mapping.

Any given area may consist of the Lyons soil, the Kendaia soil, or both. In areas where the two were mapped together, the Kendaia soil generally lies along the edge, adjacent to the better drained Lima soils, or in slightly elevated spots surrounded by the Lyons soil. In the lower part of these areas, where runoff collects, is the poorly drained Lyons soil.

The Kendaia soil can be used for some kinds of row crops, especially in drier years, but undrained areas of the Lyons soil are better suited to pasture. Both soils can be tile drained and, where drainage is adequate, are more productive than the better drained soils associated with them. In fields where the two soils are intermingled, both can be tilled if the Lyons is not too wet. Draining the Lyons soil commonly improves drainage in the Kendaia soil also. As a result, an entire field is ready for tillage when the associated Lima soils are dry enough.

The major limitations for nonfarm uses are wetness and relatively low position in the landscape. (Capability unit IVw-1; woodland suitability group 20)

Madalin Series

The Madalin series consists of deep, poorly drained, moderately fine textured soils that have a medium content of lime. These soils formed in material deposited in lakebeds during the last ice age. Most of the acreage is in the basins of Tonawanda and Oak Orchard Creeks.

The surface layer is very dark gray silty clay loam that is 6 to 10 inches thick and has a high organic-matter content. This layer is friable and is slightly acid or neutral. The supply of nitrogen is moderate to high, and the content of phosphorus and potassium is moderate.

The light-gray subsurface layer, 2 to 4 inches thick, is similar to the surface layer in texture, reaction, and supply of potassium and phosphorus. It is less friable, however, because it contains little organic matter. It is distinctly mottled, and its gray color indicates prolonged wetness.

The subsoil is gray or grayish-brown silty clay loam to clay. It is neutral to alkaline and is more compact than the layers above it. The supply of potassium is high, and that of phosphorus is moderate.

The substratum is stratified with layers of grayish, calcareous material ranging from silt loam to silty clay. Bedrock is 5 to 40 feet below the surface.

The Madalin soils remain wet until late in spring or early in summer. The water table does not fall much, even if summer is dry. These soils are too wet for most crops, but they are suited to some plants grown for hay or pasture. Flooding occurs each spring, and surface water is difficult to remove.

Madalin silty clay loam (Ma).—This level or nearly level, poorly drained soil lies in areas where surface water is removed very slowly. It is adjacent to slightly higher areas of nearly level, somewhat poorly drained Rhinebeck soil. Included with this Madalin soil are small, poorly drained areas in which the substratum consists of shaly silty clay. Also included, in depressional areas, are small areas of Fonda soils.

This soil is too wet for row crops. It is flooded every spring, and floodwater leaves the surface very slowly after the stream recedes. A few areas can be sufficiently drained, but establishing outlets is difficult, and the response to tiling is poor. Suitable grasses and legumes can be grown for hay or pasture if enough surface water is removed through surface drains.

For nonfarm uses of this soil, the major limitations are flooding, prolonged wetness, and a clayey, slowly permeable subsoil. (Capability unit IVw-2; woodland suitability group 20)

Made Land, Tillable

Made land, tillable (Md) consists of areas in which the original soil has been removed or disturbed, and the original surface layer and subsoil are not evident. These areas are mainly along the New York State Thruway. Here, the soil material was used as fill in the roadbed. Although the material generally was leveled, it is wetter now than it was in the undisturbed soil. In most places it is neutral to calcareous and can be planted to suitable legumes that are tolerant of water.

Gravel pits make up about a third of the total acreage. These occupy what was once a knoll of gravel, but the gravel was removed and the area was then graded. Alfalfa normally does well here, for its roots penetrate the gravel deeply enough to obtain sufficient moisture.

Conditions are so variable in areas of this land type that onsite investigation is needed to determine the most suitable crop. Investigation also is necessary to learn the suitability of each site for nonfarm uses. (Capability unit IIIs-3; woodland suitability group 22)

Made Land and Dumps

Made land and dumps (Me) are areas where the original soil has been covered by other materials. Generally, these materials are waste products from the mining of gypsum. In some places, however, they consist of soil material and rock rubble that were cleared from areas intended for quarrying and that now are piled in mounds. Also making up the land type are areas that have been paved or filled with gravel and are used for parking or storage. Most of these areas are next to quarries near Le Roy or are adjacent to gypsum mines west of Oakfield.

This land type is unsuitable for farming. Each site should be investigated to determine its suitability for nonfarm uses. (Capability unit VIIIs-2, woodland suitability group 22)

Manheim Series

The Manheim series consists of deep, high-lime soils that formed in medium-textured, shaly glacial till. These soils generally are somewhat poorly drained, but in some areas they are moderately well drained. Most of their acreage occurs just southwest of Batavia.

The surface layer is very dark grayish-brown to very dark brown silt loam. In some places this layer contains fragments of shale. It has a moderately high content of organic matter and a moderate supply of potassium and phosphorus. The surface layer normally is 6 to 10 inches thick. In undisturbed areas it is underlain by a very thin, leached layer, but in most cultivated fields this layer is mixed into the plow layer.

The subsoil is a nearly neutral or mildly alkaline layer of dark-brown silt loam to light silty clay loam that is mottled in varying degree with yellowish brown and dark grayish brown. Mottles occur throughout this layer in somewhat poorly drained areas, but they are lacking in the upper 3 or 4 inches in moderately well drained areas. The blocky arrangement of the material permits fair permeability and root penetration if the material is not saturated. The potassium reserve is high, and the phosphorus supply is moderate. The subsoil extends to a depth of 15 to 30 inches.

The substratum is highly calcareous, very dark grayish-brown shaly loam or shaly silt loam till in which water movement is somewhat retarded. This material has a moderate supply of potassium and phosphorus. Typically, the depth to bedrock ranges from 3½ to 10 feet. In places, however, it may be as much as 30 feet.

In April, free water normally stands within 12 inches of the surface for a considerable time. In May, it is present at a depth of 15 to 25 inches. Although roots penetrate the subsoil of Manheim soils, they are restricted mainly to the topmost 15 to 25 inches. This volume of soil can hold between 3 and 5 inches of moisture available to plants. At the height of the growing season, crops generally show that they lack sufficient moisture after 12 to 15 days without rain.

In the Manheim soils the reserve supply of nutrients is as high as it is in any other soils on uplands in the county.

Manheim silt loam, 0 to 3 percent slopes (MhA).—This nearly level soil occurs in areas that are underlain chiefly by hard, dark-colored, high-lime shale. The layer underlying the surface layer commonly is thicker than the one described for the series. Drainage is somewhat poor in most places, but it is moderately good in a few areas. The soil adjoins areas of poorly drained Ilion or Lyons soils. Included are spots of the more clayey Darien soils.

Although row crops can be grown in undrained fields, they do better if drainage is improved. The response of crops to tiling is fair to good. If the soil is adequately drained and is well managed, it can be row cropped year after year.

Nonfarm uses are limited mainly by wetness and moderate permeability. (Capability unit IIIw-2; woodland suitability group 15)

Manheim silt loam, 3 to 8 percent slopes (MhB).—This gently sloping soil is in areas underlain mainly by dark, hard, high-lime shale. About half the acreage is moderately well drained, and half is somewhat poorly drained. Included with this soil, on the crests of low knolls, are small areas of moderately well drained Mohawk soils. Also included are small areas of the more clayey Darien soils, and pockets of the poorly drained Ilion soils.

This soil is suited to cultivated crops, pasture, or woodland. It is productive under good management, though it is highly erodible. If crops are grown, adequate drainage is desirable, especially in the small included areas of more poorly drained soils.

Restricted permeability and seasonal wetness are the major limitations affecting nonfarm uses of this soil. (Capability unit IIIw-5; woodland suitability group 15)

Manlius Series

Soils of the Manlius series are moderately deep, medium textured, acid, and well drained. They contain a large amount of shale fragments in the subsoil and substratum, and they are commonly underlain by bedrock at a depth of 24 to 30 inches. The Manlius soils occur at the higher elevations along the Wyoming County line from Linden westward.

The surface layer is very dark grayish-brown shaly or very shaly silt loam that ranges from 4 to 9 inches in thickness and has a comparatively low content of organic matter. This layer is very friable and is medium acid. It has medium to low reserves of phosphorus and potassium.

The subsoil is yellowish-brown to strong-brown, strongly acid, friable shaly or very shaly silt loam. It has a medium to low supply of phosphorus and potassium. This layer may extend to only a 20-inch depth where it lies directly over shale bedrock, but it extends to a depth of as much as 36 inches where it overlies the substratum.

The substratum is dark grayish-brown to brown very shaly loam that is friable or slightly firm. In the lower part of the substratum, as much as 70 percent of the material consists of shale fragments. Dark-colored, acid, brittle shale bedrock commonly occurs at a depth of 24 to 26 inches.

In April, the depth to free water is normally 25 to 40 inches, but it may be greater in small areas. In May, free water is seldom closer to the surface than 36 inches, and it falls to a depth of many feet soon after a rain. In April, 3 or 4 consecutive drying days are needed before the soil can be plowed. Thereafter, only 1 or 2 days are needed after a heavy rain.

Reserve fertility is low in the Manlius soils, but crops respond well to good management.

Manlius very shaly silt loam, 3 to 8 percent slopes (MlB).—This gently sloping soil lies on the crests of shaly ridges, where it receives no runoff from adjacent soils. It commonly occurs above more strongly sloping Manlius soils. Included with it are small areas of nearly level, moderately well drained Marilla soils.

This soil can be used for crops, pasture, or woodland. It is suited to most crops grown locally. Potatoes do well and need less lime than field crops.

Nonfarm uses are restricted mainly by limited depth to bedrock. (Capability unit IIs-1; woodland suitability group 11)

Manlius very shaly silt loam, 8 to 15 percent slopes (MlC).—This moderately sloping, acid soil occupies areas in which it generally receives little runoff from adjoining soils. In most places it lies next to steeper or less sloping Manlius soils.

This soil is suited to cultivated crops, pasture, or trees, but it is highly susceptible to erosion. Although shale crops out in a few places, it does not interfere with tillage. The use of heavy implements is moderately limited by slope.

For nonfarm uses of this soil, the major limitations are slope and moderate depth to bedrock. (Capability unit IIIe-7; woodland suitability group 11)

Manlius very shaly silt loam, 15 to 25 percent slopes (MlD).—This moderately steep, acid soil occurs on shaly

uplands. Generally, it is shallower over bedrock than less strongly sloping Manlius soils, and shale crops out in more places. In wooded areas a very thin surface layer is underlain by a light-colored, very strongly leached layer.

This soil can be cultivated, but it has rapid runoff and is highly erodible. Limitations on the use of heavy farm implements are severe because of slope. The soil is well suited to Christmas trees in plantations. Competition from brush is only slight, and the trees grow slowly enough that they are well shaped and require little pruning.

For nonfarm uses of this soil, limited depth to bedrock and moderately steep slopes are the major limitations. (Capability unit IVe–4; woodland suitability group 11)

Manlius very shaly silt loam, 25 to 40 percent slopes (MlE).—This steep and very steep, acid soil is thinner over shale bedrock than less sloping Manlius soils. Shale crops out in many places. In wooded areas the surface layer is underlain by a strongly leached, light-colored subsurface layer. Included with this soil, in the northern part of the county, are small areas of very steep, high-lime Mohawk soils. Also included are some gully escarpments.

This soil is too steep for cultivated crops. Generally, it is so low in fertility that it produces poor pasture, and it is difficult to fertilize because of slope. Planted Christmas trees do well in all areas except the steepest ones. The soil is well suited to woodland and to plants used as cover for wildlife. Limitations on the use of equipment are severe.

Nonfarm uses are limited mainly by steep slopes. (Capability unit VIe–1; woodland suitability group 12)

Marilla Series

The Marilla series consists of nearly level to moderately sloping, strongly acid, shaly soils that are deep and moderately well drained. These soils formed in glacial till derived mainly from dark-colored, acid, brittle shale. At a depth of 18 to 24 inches is a fragipan, or panlike substratum, which is a dense layer that retards the downward movement of water. The lower subsoil and substratum have a high content of dark, brittle shale fragments. Marilla soils occur along the Wyoming County line from Linden westward.

The surface layer is very dark grayish-brown shaly silt loam 4 to 9 inches thick. It has a moderately high organic-matter content and a moderate to high content of nitrogen. The layer is strongly acid and contains medium supplies of potassium and phosphorus. It is porous and permits good root growth.

The yellowish-brown upper part of the subsoil is loose, porous shaly silt loam that extends to a depth of 12 to 18 inches. This layer is strongly acid and has only a moderate capacity to supply potassium and phosphorus. It is good physically for plant roots.

The part of the subsoil extending to a depth of 18 to 24 inches is light olive-brown very shaly silt loam mottled with gray and brown. The mottles indicate that the layer is periodically waterlogged. The material is strongly acid. Because of its high shale content, it has a lower capacity to supply moisture and plant nutrients than the layers above. It is porous and, when not too wet, permits root development.

The substratum is a fragipan consisting of very dense, compact very shaly silt loam or loam. This material is slowly permeable and restricts the downward movement of water and roots. It is underlain by shale bedrock at a depth of 40 inches to 10 feet.

In April, free water is 10 to 30 inches below the surface, and 5 or 6 consecutive drying days are needed before the soil can be plowed. In May, free water is seldom closer to the surface than 15 inches, and 3 or 4 consecutive drying days are needed before tillage. During the remaining part of the growing season, only 1 or 2 drying days are required after a rainy spell.

The soil material above the fragipan can hold between 3 and 5 inches of water available to plants. After free water has been removed from material above the pan, plants begin to show moisture stress after 10 to 15 days without rain.

Strong acidity is the main limitation affecting plant nutrition in the Marilla soils. In addition, the availability of nitrogen, potassium, and phosphorus is moderate to low. If productivity is to be at least moderate, fertilization and liming are needed in cultivated fields.

Marilla shaly silt loam, 0 to 3 percent slopes (MmA).—This nearly level soil is not quite so well drained as other Marilla soils, and generally it is more distinctly mottled in the lower subsoil. It lies below and adjacent to gently sloping Manlius soils.

Most crops are suited to this soil, but improved drainage is desirable so that fields can be farmed early in spring. The response to tiling is fair to poor. Potatoes are suited if excess water can be removed from wet spots.

Nonfarm uses are limited mainly by seasonal wetness and slow permeability. (Capability unit IIw–2; woodland suitability group 13)

Marilla shaly silt loam, 3 to 8 percent slopes (MmB).—This gently sloping, acid soil is moderately well drained, but it is a little better drained on the upper and middle parts of slopes than it is on the lower part. It commonly lies adjacent to other Marilla soils, and in places it is next to more sloping Manlius soils. Included with this soil are small areas of the somewhat finer textured Fremont soils and the well-drained Manlius soils.

Crops, pasture, and woodland are suited to this soil. Potatoes do better on it than on the nearly level Marilla soil because excess water is removed before it harms the crops. In fields that are intensively used, measures are needed for conserving moisture and controlling erosion. Draining wet spots is desirable.

For nonfarm uses of this soil, the major limitations are slow permeability and seasonal wetness. (Capability unit IIe–4; woodland suitability group 13)

Marilla shaly silt loam, 8 to 15 percent slopes (MmC).—This moderately sloping, acid, moderately well drained soil commonly receives runoff from higher Marilla soils. In cultivated fields it has an eroded plow layer, but in wooded areas its original surface layer is underlain by a thin, highly leached subsurface layer. Included with this soil are small areas of the well-drained Manlius soils and the somewhat finer textured Fremont soils.

This soil is suited to crops, pasture, and woodland. In cultivated areas moderate slopes and the hazard of erosion are major limitations. The soil is suited to Christmas trees grown in plantations, for the competition from

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brush is only slight, and the seedlings grow into well-formed trees that require little pruning.

Nonfarm uses are limited mainly by restricted permeability, seasonal wetness, and moderate slopes. (Capability unit IIIe 6; woodland suitability group 13)

Middlebury Series

The Middlebury series consists of medium-textured alluvial soils that formed in material deposited along streams. These soils generally are moderately well drained, but in places they are somewhat poorly drained. They are subject to flooding in spring, and they remain wet for a short to moderate time after the floodwater recedes. Middlebury soils lie along the smaller streams that drain the areas of acid shaly till in southern Genesee County.

The surface layer is dark grayish-brown silt loam 4 to 10 inches thick. This strongly acid, friable layer is the main root zone for most plants. It has an organic-matter content of 4 to 6 percent, which is slightly higher than that in the underlying layers. The supply of potassium and phosphorus is moderate.

Underlying the surface layer is strongly acid, brown or grayish-brown silt loam that is distinctly mottled below a depth of 14 to 18 inches. It contains a moderate supply of phosphorus and potassium.

This material is underlain, in turn, by shaly glacial till or by mixed gravel and sand. Bedrock, chiefly hard shale, occurs at a depth ranging from 4 to 10 feet or more.

The Middlebury soils are flooded almost every spring. After the flooding has ended, the water table seldom falls below a depth of 6 feet, even in dry summers. The risk of damaging floods severely limits the use of these soils.

Middlebury silt loam (Mn).—This nearly level soil is silt loam and stone free to a depth of 3 to 4 feet. It is underlain by various kinds of shaly or gravelly soil material.

This soil generally can be used for hay crops, and many areas are used for pasture. Selected areas can be row cropped, but flooding from the adjacent stream is a distinct hazard. A large amount of lime is needed if the soil is used for crops.

Nonfarm uses are limited mainly by the flooding hazard. (Capability unit IIIw–6; woodland suitability group 6)

Minoa Series

In the Minoa series are deep, somewhat poorly drained, moderately coarse textured soils that formed in lacustrine or eolian deposits. These soils are dominantly sandy, but they contain some silt or clay and consequently are less droughty than the sandy Stafford soils. Most of the sand in the Minoa soils is very fine or fine, though in some layers it is of medium size. These soils occur across the northern half of the county, and there are small areas in the valleys in the southern part.

The present surface layer is very dark grayish-brown very fine sandy loam or fine sandy loam. This layer is 7 to 10 inches thick in most places, and it has a fairly high content of organic matter. It is porous, has a moderate water-holding capacity, and generally is slightly acid or neutral. The layer has a low potassium reserve and moderate phosphorus-supplying power.

The upper part of the subsoil is yellowish-brown, porous very fine sandy loam or loamy very fine sand that contains many mottles. It extends to a depth of 14 to 18 inches. When not too wet, the layer is excellent for root development. It is slightly acid, and its supply of available nutrients is moderately low.

The lower part of the subsoil is a mottled layer that extends to a depth of 30 to 50 inches. In some places it is pale-brown very fine sandy loam that has a slightly higher clay content than the layers above. In other places it consists of layers of loose, grayish-brown loamy fine sand and bands of dark-brown very fine sandy loam. This part of the subsoil is slightly acid or neutral. It has a moderately low supply of potassium and phosphorus.

In most areas the substratum is loamy fine sand that contains less silt and clay than the layers above it. Because this material is wet much of the year, only a few roots penetrate it. Generally, the substratum is calcareous.

The Minoa soils are saturated when frost leaves the ground in spring. In April, free water is at a depth ranging from 4 to 15 inches. At this time, 5 to 8 consecutive drying days are needed before the soil can be plowed. In May, free water stands within 8 inches of the surface during rainy periods, but it falls to a depth of 20 inches after several rainless days. During this month, 3 to 5 consecutive drying days are needed before plowing. In June, 2 or 3 drying days are sufficient.

The root zone is limited to the uppermost 24 inches. This volume of soil can hold between 3 and 4 inches of moisture available to plants. After a prolonged dry period in midsummer, crops show moisture deficiency after 12 to 18 days without rain. The surface layer of these soils has a moderate capacity to absorb nutrients.

In Genesee County the Minoa soils were not mapped separately. They were mapped only in an undifferentiated unit, Galen and Minoa very fine sandy loams, 0 to 2 percent slopes. For a description of this unit, see the Galen series.

Mohawk Series

The Mohawk series consists of deep and moderately deep, high-lime soils that formed in medium-textured, shaly glacial till. These soils are well drained or modererately well drained. Most of their acreage lies just southwest of Batavia.

The surface layer in cultivated fields is very dark brown silt loam or shaly silt loam that ranges from 5 to 10 inches in thickness and has a moderate content of organic matter. This layer is nearly neutral. It contains a moderate amount of phosphorus and potassium.

In a few places the surface layer is underlain by a very thin, leached subsurface layer. Generally, however, the subsurface layer has been destroyed in plowing.

The subsoil is very dark grayish-brown to dark-brown shaly silt loam. It is nearly neutral or mildly alkaline, has fine blocky structure, and, in some places, contains a few faint mottles. The reserve of potassium is high, and the supply of phosphorus is moderate. The subsoil extends to a depth of 15 to 30 inches.

The substratum is highly calcareous glacial till consist-

ing of very dark grayish-brown shaly loam or shaly silt loam. In this material the movement of water is somewhat restricted. The potassium reserve is high, and the phosphorus supply is moderate. Bedrock typically occurs at a depth of 3 to 10 feet, but in some areas it lies at a depth of only 20 to 36 inches.

Normally, ground water is 15 to 25 inches below the surface in April. At this time of year, 3 to 5 consecutive drying days are needed before the soil can be plowed. In May, free water is at a depth of 24 to 40 inches and falls rapidly in drier weather. During this month, 1 to 3 drying days are needed before plowing. In June the soil dries rapidly and the water table is at a great depth.

The Mohawk soils are readily penetrated by roots throughout the growing season. Their reserve supply of nutrients is among the highest for soils on uplands in the county.

Mohawk silt loam, 2 to 8 percent slopes (MoB).—This nearly level and gently sloping soil occupies areas that receive no runoff from adjacent soils. Locally, spots of more clayey Darien soils are included.

Most crops can be grown on this soil. Natural fertility is high, and little lime is needed for most crops. Included wet spots may need drainage.

For nonfarm uses, moderate permeability is the main limitation. (Capability unit IIe–1; woodland suitability group 5)

Mohawk silt loam, 8 to 15 percent slopes (MoC).—This deep soil is moderately sloping, but the slopes tend to be short and choppy. Included with it are small areas that are only moderately deep to shale bedrock.

Most crops are suited to this soil. Because conservation measures are difficult to establish, however, intertilled crops should be grown in a suitable rotation. Reserve fertility is high. The use of heavy implements is moderately limited by slope.

For nonfarm uses the major limitations are moderate permeability and moderate slopes. (Capability unit IIIe–1; woodland suitability group 5)

Mohawk silt loam, 15 to 25 percent slopes (MoD).—This moderately steep soil is well drained in most places. The surface layer and subsoil are thinner than those described as typical for the series. Small inclusions of Mohawk soils are only moderately deep to shale bedrock. Also included are some moderately eroded spots.

This soil is suited to most crops, but it is highly erodible if cultivated. Generally, it is better suited to sod crops than to row crops, for the use of modern farm equipment is limited. Although reserve fertility is high, crops are more likely to be affected by drought on this soil than they are on less strongly sloping Mohawk soils.

The major limitations for nonfarm uses are moderate permeability and moderately steep slopes. (Capability unit IVe–2; woodland suitability group 5)

Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes (MpB).—This nearly level and gently sloping soil receives little runoff from adjacent areas. It is more acid than typical Mohawk soils. The depth to hard, dark-colored shale ranges from 20 to 40 inches. Small wet spots are included.

Most crops can be grown on this soil, though rooting of deep-rooted legumes and trees is somewhat restricted. Wet spots are difficult to drain because the limited depth to bedrock hinders the installation of tile lines. Only small to moderate additions of lime are needed.

Depth to bedrock is the major limitation affecting nonfarm uses of this soil. (Capability unit IIe–1; woodland suitability group 5)

Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes (MpC).—This moderately sloping soil is 20 to 40 inches deep over hard, dark-colored shale bedrock. It is more acid than typical Mohawk soils. Some small inclusions are less than 20 inches deep, and others are more than 40 inches deep.

Most crops can be grown on this soil, but the rooting of trees and deep-rooted legumes is somewhat restricted. Establishing a suitable cropping system is difficult because slopes are so short. The use of heavy equipment is moderately limited by shallow included areas and by slope.

For nonfarm uses of this soil, depth to bedrock and moderate slopes are the major limitations. (Capability unit IIIe–1; woodland suitability group 5)

Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes (MpD).—This moderately steep, mostly well-drained soil is 20 to 40 inches deep to hard, dark-colored shale bedrock. It is more acid than typical Mohawk soils and is thinner in the surface layer and subsoil. In some cultivated fields, the plow layer is very shaly. Included are small areas that are less than 20 inches deep to bedrock and small ones that are more than 40 inches deep.

This soil can be used for row crops, but it is more droughty than deeper, less sloping soils. It is better suited to sod crops. Slope and limited depth severely restrict the use of heavy machinery.

The major limitations for nonfarm uses are shale bedrock, generally about 2 feet below the surface, and moderately steep slopes. (Capability unit IVe–4; woodland suitability group 5)

Muck, Deep

Muck, deep (Mr) consists of areas in which muck is at least 42 inches thick over marl or other mineral soil material. The muck is made up of the decayed remains of fibrous and woody plants. It is black and well decomposed in the upper part but is very dark brown and only partially decomposed below a depth of 20 inches. Fragments of trees are common below a 2-foot depth. The muck generally ranges from 4 to 10 feet in thickness, though in places it is as much as 20 feet thick. It ranges from strongly acid to neutral but generally is acid to some degree.

Most of the underlying material is lacustrine in origin and consists of well-sorted sand, silt, or clay. Varved deposits of differing mineral material are common. In other areas the muck is underlain by stony till, and in a few areas it is underlain by marl.

Muck, deep, occurs mainly in the basin of Oak Orchard Creek, adjacent to the Orleans County line. A sizable acreage also is in the Pembroke and Batavia Swamps. Included are small areas of muck that is only moderately thick over mineral material.

Where adequately drained, this land type is used chiefly for the production of onions. It also can be used for

potatoes, carrots, lettuce, endives, parsnips, and other kinds of crops. Maintaining adequate drainage is increasingly difficult, however, because outlets become unsuitable as the muck subsides. Pumping units are used to provide both drainage and subirrigation (fig. 14).

***Figure 14.*—A foundation for a pumping unit that can be used either to drain or to irrigate the cultivated field in the background.**

Wildlife is a suitable use for areas that are too small for cropping or are difficult to drain economically. Some of the acreage is in Federal or State wildlife refuges, where it is managed as habitat.

Extreme wetness and the high organic-matter content are the chief limitations affecting nonfarm uses. (Capability unit IIIw-7; woodland suitability group 21)

Muck, Shallow

Muck, shallow (Ms) consists of areas where muck is underlain by mineral material at a depth of 12 to 42 inches. The muck is in a black, very strongly acid to slightly acid layer made up of the decayed remains of woody plants. In most places the underlying material is lacustrine in origin and consists of well-sorted sand, silt, or clay. Commonly, however, it is varved deposits of differing soil material. Some areas are underlain by stony till.

Muck, shallow, occurs mainly in the Oak Orchard Creek basin. Here, it lies along the edge of the basin between areas of Muck, deep, and soils on uplands. In addition, there are isolated pockets of this land type scattered across the northern half of the county. Small areas of Muck, deep, are included.

This shallow land type is less desirable for onions than the deep unit. Where it is adequately drained, however, it is suited to onions, potatoes, carrots, lettuce, endives, and parsnips. Adequate drainage is increasingly difficult to maintain because the outlets gradually cease to function as the muck subsides. Muck, shallow, is better suited to crops than Edwards muck. It is less adversely affected by shrinkage, for it is underlain by material that is less damaging to plants than the marl that underlies the Edwards soil. Areas too small to be drained economically are suitable for wildlife.

Nonfarm uses are severely limited by extreme wetness and the layer of organic material. Some areas can be used as a source of peat for landscaping. (Capability unit IVw-5; woodland suitability group 21)

Niagara Series

In the Niagara series are deep, nearly level, somewhat poorly drained soils that formed in calcareous lake deposits. These soils consist mainly of silt and very fine sand, but they contain a moderate amount of clay. The size of soil particles is uniform, and there are few or no stones. Niagara soils occur throughout the northern half of the county.

The surface layer in cultivated fields is very dark gray to very dark grayish-brown silt loam that ranges from 7 to 10 inches in thickness and from 5 to 8 percent in content of organic matter. The nitrogen content is moderately high. This layer is porous and is easily penetrated by roots and water. It has good water-holding capacity but only a moderate supply of available potassium and phosphorus. In unlimed areas the layer is slightly acid.

Underlying the surface layer is a thin leached layer of strongly mottled grayish-brown silt loam or very fine sandy loam. It extends to a depth of 12 to 18 inches. Its grayish color and strong mottling show that the layer is wet for moderate periods of time. In some places this subsurface layer has been destroyed by deep plowing.

The subsoil is strongly mottled reddish-brown heavy silt loam or silty clay loam that extends to a depth ranging from 24 to 40 inches. Its mottling indicates that this layer also is wet for moderate periods. The soil material is arranged in blocks, and plant roots can grow between the blocks. The subsoil has a slightly higher potassium reserve than the surface layer, but it has only a moderate capacity to supply phosphorus. It is nearly neutral in most places, though its lower part is mildly alkaline in some areas.

Layers of silt and very fine sand, together with thin layers of clay, make up the substratum. Because the clay restricts water movement, water and air penetrate the substratum very slowly. The material is commonly wet for long periods, and few roots enter it. The depth to free lime ranges from 24 to 40 inches. Bedrock occurs at a depth of 4 to 40 feet or more.

The Niagara soils are saturated when frost leaves the ground in spring. During April, free water is at a depth of 4 to 15 inches. At this time, 5 to 8 consecutive drying days are needed before the soil can be plowed. In May, free water is within 8 inches of the surface during rainy periods, but it falls to a depth of 20 inches if several days pass without rain. During this month, 4 to 6 consecutive drying days are needed before plowing. In June, 2 or 3 drying days are sufficient.

Plant roots are confined chiefly to the surface layer in spring, but they extend to a depth of as much as 24 inches as the growing season progresses. In most areas the main zone of rooting is 15 to 24 inches thick in midsummer.

This zone can hold between 3 and 5 inches of moisture available to plants.

The surface layer has a moderately high capacity to absorb bases, but Niagara soils have only a moderate capacity to supply potassium and phosphorus.

Niagara and Collamer silt loams, 0 to 2 percent slopes (NaA).—The nearly level soils in this undifferentiated unit generally occur in such an intricate pattern that mapping the soils separately was impractical (fig. 15). Nearly 55 percent of the total acreage is the some-

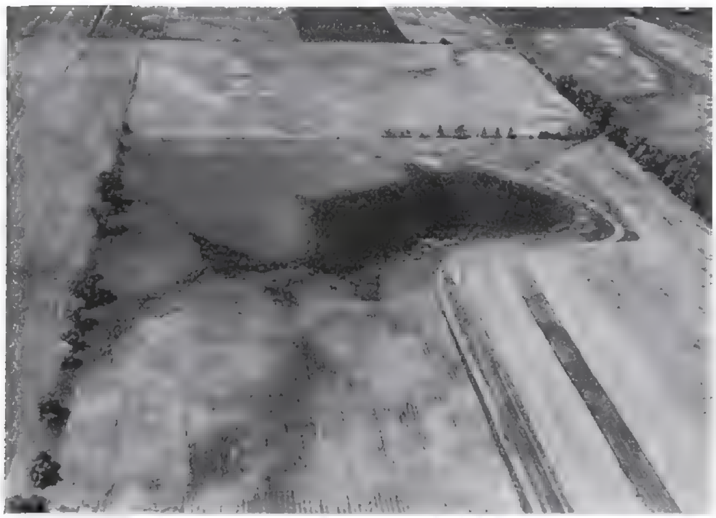

Figure 15.—**Aerial view of Niagara and Collamer silt loams, 0 to 2 percent slopes. The darker areas are Niagara soil, and the lighter areas are Collamer soil.**

what poorly drained Niagara soil or a closely associated soil having similar drainage. Nearly 45 percent is the moderately well drained Collamer soil or a closely associated soil having similar drainage. Included areas of other soils account for the small remaining acreage.

Any given area mapped as this unit may consist only of the Niagara soil or the Collamer soil. In most areas, however, the two soils occur together, the Niagara in the lower part and the Collamer in the slightly higher part. Both soils receive some runoff from adjacent slopes, though the Niagara gets the larger share.

Small inclusions of the Minoa soils or the Galen soils were mapped in places where sandy bands are dominant in the subsoil. Also included in mapping were small areas of better drained or more poorly drained soils.

After drainage is improved, the soils in this unit are suited to many kinds of crops. Truck crops do well, but seedbeds are slightly more difficult to prepare than on the more sandy soils. Legumes and grasses generally grow better than on the sandy soils, for reserve fertility in these loamy soils is higher. Tile lines need wrapping only in the included sandy spots.

Nonfarm uses are limited mainly by wetness and by instability of the substratum, which is subject to piping. (Capability unit IIIw–2; woodland suitability group 10)

Nunda Series

The Nunda series consists of deep, gently sloping to moderately steep, moderately well drained and well drained soils that formed in a mantle of silt, 20 to 40 inches thick, over clayey material. These soils occur mainly at the higher elevations in the towns of Bethany and Pavilion.

The surface layer in cultivated fields is dark grayish-brown silt loam that is 6 to 11 inches thick and contains a small to moderate amount of organic matter. It is very friable, is moderately acid to neutral, and has good moisture-holding capacity. The supplies of nitrogen, potassium, and phosphorus are moderate.

The subsurface layer is brown silt loam 8 to 12 inches thick. It is similar to the surface layer in most respects, but it has a lower organic-matter content.

The upper part of the subsoil is grayish-brown silt loam that is mottled. This layer is friable and easily penetrated by roots. It extends to a depth of 20 to 40 inches.

The lower part of the subsoil is grayish silty clay loam. This neutral or slightly calcareous layer is more compact than the upper subsoil. In most places it is mottled. The reserve of phosphorus is moderate, and that of potassium is high. This layer extends to a depth of 30 to 50 inches.

The substratum generally is compact, calcareous silty clay loam. It contains many shale fragments and is underlain by bedrock at a depth ranging from 3½ to 30 feet.

When frost leaves the ground in spring, these soils are saturated for a short time. During April, 4 to 7 consecutive drying days are needed before the soil can be plowed. In May, 2 to 4 days are needed. After the initial saturation period, the water table falls to a great depth.

The Nunda soils are highly productive. Corn and dry beans are the principal row crops, and a large acreage is used for small grain and hay.

Nunda silt loam, 3 to 8 percent slopes (NuB).—This gently sloping soil occurs in convex areas that receive little runoff from adjacent slopes. In most places it occupies the highest part of the landscape, above more sloping soils. Small areas of Darien or Conesus soils are included.

Most crops suited to the county can be grown on this soil, but erosion is a moderate hazard. Improved drainage is needed in some included areas that are wet. Limitations on the use of heavy machinery are only slight.

Nonfarm uses are limited mainly by slow permeability in the subsoil and the substratum. (Capability unit IIe–6; woodland suitability group 8)

Nunda silt loam, 8 to 15 percent slopes (NuC).—This moderately sloping soil occupies areas where a silty mantle overlies contrasting clayey material. It commonly lies below and adjacent to the gently sloping Nunda soil. Included with it are small areas of Darien, Lansing, or Conesus soils.

This soil is used primarily for crops grown in support of dairying. In some places it also is used for dry beans. Erosion is a severe hazard, and slope is a moderate limitation on the use of heavy implements.

For nonfarm uses of this soil, the major limitations are slow permeability and moderate slopes. (Capability unit IIIe 4; woodland suitability group 8)

Nunda silt loam, 15 to 25 percent slopes (NuD).—This moderately steep soil is in areas where a silty mantle overlies contrasting clayey material. It lies adjacent to gently sloping or moderately sloping Nunda soils. Compared with a soil typical for the Nunda series, this soil is thinner and contains less organic matter in the surface layer, and it is less mottled in the subsoil. Small areas of Darien or Lansing soils are included.

Most crops used in dairying can be grown on this soil. The use of heavy machinery is severely limited by slope.

Moderately slow permeability and moderately steep slopes are the major limitations affecting nonfarm uses of this soil. (Capability unit IVe–3; woodland suitability group 8)

Odessa Series

The Odessa series consists of deep, nearly level and gently sloping soils that are somewhat poorly drained. These soils formed in silt and clay laid down in glacial lakes. Their subsoil is one of the reddest and finest textured in Genesee County. Odessa soils occupy areas scattered throughout the northern half of the county.

The surface layer, 7 to 10 inches thick, is very dark grayish-brown silt loam that contains a moderately large amount of organic matter. This layer has a high moisture-holding capacity. It is neutral and has a moderate supply of potassium and phosphorus.

The subsurface layer extends to a depth of 12 to 16 inches. It consists of neutral, light brownish-gray heavy silt loam in which there are many yellowish-brown and strong-brown mottles. This layer is more porous and friable than the subsoil. When it is not saturated with water, it is good physically for root development. Its supplies of potassium and phosphorus are moderate. In some places the layer has been obliterated by deep plowing.

The subsoil is neutral or slightly calcareous, reddish-brown silty clay or clay that is mottled with brown to reddish gray. It is arranged in blocks, which permit roots to penetrate the layer when it is dry enough. Because of the high clay content, the potassium supply is moderately high. The content of phosphorus is moderate.

The calcareous substratum is mainly reddish-brown silty clay loam, but in places there are layers of silt, clay, and very fine sand. The depth to bedrock ranges from 15 to 50 feet.

These soils are saturated when frost leaves the ground in spring. During April, free water is only 5 to 15 inches below the surface. At that time, 10 to 12 consecutive drying days are needed before the soil can be plowed. In May, the depth to free water is 10 to 20 inches. During that month, 6 to 8 consecutive drying days are needed before plowing. In June, 3 or 4 drying days are required after a heavy rain. If the Odessa soils are worked when wet, their favorable structure can be severely damaged.

In undrained areas, plant roots are confined mainly to the topmost 12 to 15 inches of soil. In a normal growing season, this volume of soil will provide an adequate supply of water for plants.

Because of the moderately high organic-matter content, the surface layer has a high capacity to absorb nutrients and lime. On these neutral soils, however, relatively little lime is needed.

Odessa silt loam, 0 to 2 percent slopes (OdA).—This nearly level, high-lime soil is in areas that receive runoff from higher soils. Small inclusions of Lakemont soils lie in depressional areas. These inclusions occur as wet spots, which generally are shown by symbol on the soil map. Also included are small areas of Ovid soils in places where the soil material normally is clayey but contains erratic spots of glacial till.

Unless artificial drainage is provided, row crops cannot be successfully grown on this soil, but water-tolerant grasses and legumes do fairly well. A high reserve of potassium in the subsoil favors the growth of legumes. If the soil is drained, most kinds of row crops grow well.

Nonfarm uses are limited chiefly by wetness, slow permeability, and the high content of clay. (Capability unit IIIw–1; woodland suitability group 16)

Odessa silt loam, 2 to 6 percent slopes (OdB).—This gently sloping, high-lime soil occupies areas that receive runoff from adjacent soils. In some places it lacks the light-colored upper part of the subsoil that is typical for the series. Included with this soil, on the crests of low knolls in undulating areas, are small areas of Schoharie soils. Also included, in places having erratic spots of glacial till mixed with the clayey soil material, are small areas of Ovid soils.

Row crops can be produced on this soil, but their growth commonly is spotty because plants in the many troughs and drainageways are injured or drowned by excess water. Draining undulating areas with tile generally makes them suitable for rowcropping.

The major limitations for nonfarm uses are wetness, slow permeability, and accumulating runoff. (Capability unit IIIw–4; woodland suitability group 16)

Ontario Series

Soils of the Ontario series are deep, nearly level to steep, medium textured, and well drained. These soils formed in reddish, moderately calcareous glacial till. They occur throughout the county, but most of their acreage is in the northern half.

The surface layer in cultivated fields is 6 to 10 inches of dark-brown loam or stony loam that contains a moderate amount of organic matter. It is porous, well aerated, and easily penetrated by roots. In unlimed areas it is medium acid. Generally, this layer has a moderate capacity to supply potassium and phosphorus.

Underlying the surface layer is a brown subsurface layer that ranges from loam to fine sandy loam in texture. It extends to a depth of 12 to 16 inches. It is medium acid and has a moderate capacity to supply potassium and phosphorus. In cultivated fields some of this layer may be mixed into the plow layer.

The brown to reddish-brown subsoil is a layer of clay accumulation. It ranges from loam to clay loam and contains a considerable amount of gravel. In uneroded areas the subsoil begins at a depth of 12 to 16 inches and extends to a depth of 30 to 48 inches. The brown colors in this layer are generally mottle free and indicate good aeration, but some mottling occurs in the lower part. Although the subsoil contains a considerable amount of clay, the blocky arrangement of the soil material permits root and water penetration. This layer is medium acid to

neutral in the upper part and is neutral or slightly calcareous in the lower part. Because it has a higher clay content than the other layers, it has a larger potassium reserve. The supply of phosphorus is moderate.

The substratum is calcareous loamy till that contains some gravel. In some areas a large proportion of the substratum is sand, but the material is firm and has moderately slow or slow permeability. Aeration and root penetration are poor. Although the depth to the substratum ranges from 30 to 48 inches, in most places it is about 3 feet. Bedrock is at a depth ranging from 4 to 50 feet or more.

The Ontario soils are among those that dry out most rapidly in spring, and they receive little accumulated runoff from adjacent areas. Consequently, they generally can be worked after only 2 or 3 consecutive drying days in spring. Most crops fill the uppermost 12 to 16 inches of soil with fine roots, and as the growing season advances, they extend their roots into the subsoil. Alfalfa and other deep-rooted crops send roots to the top of the underlying till. In midsummer, most crops probably have roots in the upper 30 to 40 inches. This volume of soil can hold between 5 and 7 inches of water available to plants. At the height of the growing season, however, crops generally show signs of moisture deficiency after 8 to 10 days without rain.

These soils are among the most productive in the county. Crops respond well to liming and fertilization.

Ontario loam, 0 to 3 percent slopes (OnA).—This nearly level soil receives no runoff from adjacent soils. It occupies some of the wider ridgetops in the northern part of the county. Also, a considerable acreage lies just south of the Onondaga escarpment near Morganville. Included are small areas of Honeoye soils.

This soil is well suited to nearly all the crops grown in the county. Some included spots are wet, and in these planting may be delayed for a day or two in spring. Limitations on the use of equipment are few or none.

Nonfarm uses of this soil are slightly limited by inadequate permeability in the lower subsoil and the substratum. (Capability unit I–2; woodland suitability group 3)

Ontario loam, 3 to 8 percent slopes (OnB).—This gently sloping soil generally occurs in convex areas above steeper Ontario soils. It also lies in positions above gently sloping Hilton or Lima soils and below nearly level Ontario soils. In these positions, however, it receives little runoff from higher slopes. Included with this soil are small areas of Cazenovia soils.

All crops commonly grown in the county are well suited to this soil. Many areas are used intensively for intertilled crops. Pasture plants and trees also do well. Loss of water through runoff and a slight erosion hazard, especially on longer slopes, are the chief concerns of management.

This soil has few limitations for nonfarm uses. (Capability unit IIe–1; woodland suitability group 3)

Ontario loam, 8 to 15 percent slopes (OnC).—This moderately sloping soil is commonly on elongated ridges or on the sides of ridges. It is similar to typical Ontario soils in most respects, but its leached subsurface layer is thinner. Small included spots are moderately eroded, and in these places some of the subsurface layer has been mixed into the plow layer during tillage. Also included are small areas of gravelly Palmyra soils.

This soil is suited to crops, pasture, or woodland, though much of the rain that falls on it is lost as runoff. If management is good, productivity is good to excellent. In fields where intertilled crops are grown, limitations on the use of some kinds of heavy equipment are moderate.

Nonfarm uses of this soil are moderately limited by slope. (Capability unit IIIe–1; woodland suitability group 3)

Ontario loam, 15 to 25 percent slopes (OnD).—This moderately steep soil commonly occurs as elongated ridges or on the sides of ridges. Except in wooded areas, it lacks the leached subsurface layer that is typical of Ontario soils.

Using this soil for crops is severely limited because slopes are moderately steep, runoff is rapid, and the erosion hazard is severe. The soil should be kept permanently covered and is suited to pasture or trees. Handling equipment on it is difficult.

For nonfarm uses of this soil, slope is a severe limitation. (Capability unit IVe–2; woodland suitability group 3)

Ontario and Lansing soils, 25 to 40 percent slopes (OrE).—Any given area of this undifferentiated unit may consist of the Ontario soils, the Lansing soils, or soils of both series. In the northern half of the county, the unit lies on the steep and very steep sides of drumlinlike ridges and consists mostly of the Ontario soils. In the towns of Pavilion and Bethany, the unit occupies very steep areas on the long hillsides that make up the northern fringe of the Allegheny Plateau. Here, the Lansing soils are dominant. Small inclusions of the much shalier Mohawk soils are on short, choppy side slopes just south of Batavia.

The soils of this unit are too steep for cultivated crops, but in some places they can be used for pasture. Many areas are wooded or idle.

Nonfarm uses are limited mainly by steep or very steep slopes. (Capability unit VIe–1; woodland suitability group 4)

Ontario stony loam, 2 to 8 percent slopes (OsB).—This nearly level and gently sloping soil is mainly between the city of Batavia and the village of Stafford, though it also occurs in the northeastern corner of the county. It is similar to typical Ontario soils in most respects, but it has a higher content of stones and boulders.

The original surface layer is 15 to 35 percent gravel and cobblestones as much as 6 inches across. In many cultivated fields, however, the larger stones and cobblestones have been removed and the plow layer contains only a few stones, which are more than 10 inches across. Coarse fragments make up about 50 percent of the subsoil and substratum, by volume. These fragments are mainly cobblestones and stones that range from 5 to 15 inches across. Stones as much as 2 feet in size are common, and there are a few large slabs of limestone. In the northeastern corner of the county, this stony soil is made up primarily of sandstone boulders.

Although the larger stones generally have been removed from the surface layer in tilled fields, plow points and cultivators break at a higher rate in this soil than they do in less stony Ontario soils. Nevertheless, crops

can be grown on this soil, and they root deeply. The amount of fertilizer needed is about the same or slightly less than on typical soils of the series.

Nonfarm uses of this soil are severely limited by the large stones encountered in excavating. (Capability unit IIIs–4; woodland suitability group 3)

Ontario stony loam, 8 to 15 percent slopes (OsC).—This moderately sloping soil occupies areas that are within or adjacent to areas of less sloping stony Ontario soils. The larger stones have been removed from a smaller proportion of this soil than from the stony soils having milder slopes. In fields where the larger stones have been taken off, the surface layer is 20 to 50 percent gravel and cobblestones as much as 6 inches across. In areas where the larger stones remain, coarse fragments make up about 50 percent of the entire soil, by volume. These fragments are mostly cobblestones and stones 5 to 15 inches in diameter. Stones as much as 2 feet across are common, and a few large boulders occur. Small included areas are so stony that they cannot be close tilled.

Most of this soil can be used for alfalfa or other deep-rooted crops. In all tilled fields, however, the breakage of machinery is moderate to severe. The included areas that are too stony for seeding are generally pastured or wooded.

Nonfarm uses of this soil are limited because slopes are moderate and excavating is hindered by boulders. (Capability unit VIs–1; woodland suitability group 3)

Ovid Series

The Ovid series consists of deep, somewhat poorly drained and moderately well drained, moderately fine textured soils that formed in glacial till or a mixture of till and lacustrine material. These reddish soils have a high content of lime. They occur in the northern half of the county, mainly just north of the Onondaga limestone escarpment.

The surface layer is very dark grayish-brown silt loam that is 7 to 10 inches thick in plowed fields. This layer is neutral and contains a moderate amount of organic matter. The content of potassium and phosphorus is moderate.

Underlying the surface layer is a thin, leached subsurface layer of pinkish-gray silt loam. It is saturated with water seasonally and is distinctly mottled. It is neutral or slightly acid. This layer extends to a depth of 12 to 15 inches, but it may be thin or missing in fields that are deeply plowed.

The mottled reddish-brown subsoil is typically silty clay loam. Although the layer is periodically waterlogged, its blocky structure allows some root penetration. The supply of phosphorus is moderate, and the reserve of potassium is high. The subsoil extends to a depth of 24 to 36 inches.

The substratum is reddish brown and calcareous. In most places it is dense, slowly permeable gravelly or gritty silty clay loam. It is underlain by bedrock at a depth ranging from 6 to 40 feet.

In April, the Ovid soils are wet. From 5 to 8 consecutive drying days are needed before the soils can be plowed. In May, 3 or 4 drying days are needed. The water table is high in spring, but it falls to a great depth in summer.

These soils have a moderate capacity for storing moisture. The root zone can hold between 3½ and 5 inches of water available to plants. Generally, the soils need little lime. Draining them adequately is the major concern.

Ovid silt loam, 0 to 3 percent slopes (OvA).—This nearly level soil receives runoff from gently sloping Ovid or Cazenovia soils, and it is somewhat poorly drained. It generally has a thicker surface layer than the gently sloping Ovid soils. Included with this soil, in places where lacustrine clay is dominant in the profile, are small areas of Odessa soils. Small inclusions of Appleton soils occur in areas where the subsoil is less clayey. Also included are small areas of poorly drained Romulus soils.

If undrained, this soil is suited to water-tolerant legumes and grasses. The planting of row crops is delayed for a considerable time by an ordinary rain. After the soil is drained, however, it produces a good growth of crops common in the county.

Nonfarm uses are moderately limited by wetness and a relatively high content of clay. (Capability unit IIIw–1; woodland suitability group 16)

Ovid silt loam, 3 to 8 percent slopes (OvB).—This gently sloping soil is in low, undulating areas, and it also occupies foot slopes below the Cazenovia soils. In most areas it is moderately well drained, but in places it is somewhat poorly drained. Small areas of Odessa, Appleton, and Kendaia soils are included.

Some random tiling is needed if this soil is to be row cropped. After drainage is improved, the soil produces well. The use of heavy equipment is limited to some extent. Most hay crops except alfalfa do well in undrained fields.

This soil has moderate limitations that affect nonfarm uses. (Capability unit IIIw–4; woodland suitability group 16)

Palmyra Series

Soils of the Palmyra series are deep, well drained, and gravelly. These nearly neutral soils formed in glacial outwash that consists of gravel and sand having a high content of limestone. They occur in nearly level areas on outwash terraces along the major streams and in hilly areas on kames that parallel the streams. Adjoining them in most places are the Genesee, Eel, or Wayland soils.

The surface layer in cultivated fields is dark grayish-brown gravelly loam or shaly silt loam that ranges generally from 5 to 11 inches in thickness and from 3 to 5 percent in organic-matter content. This porous layer is excellent for root growth. It has a medium supply of calcium, potassium, and phosphorus.

The subsurface layer extends to a depth of 12 to 17 inches. It is leached, pale-brown gravelly loam that is porous and permeable, has moderate nutrient-supplying power, and is low in organic-matter content. Plant roots grow well in this layer.

The subsoil extends to a depth of 24 to 42 inches and is mainly brown gravelly light clay loam. This layer contains more clay than any other layer in these soils. It can supply a moderate amount of moisture and plant nutrients.

Underlying the subsoil is glacial outwash consisting of very loose, porous, calcareous gravel and sand. In some

areas these materials are mixed, but in others they are stratified in layers. Tongues of clayey material from the subsoil commonly extend into the unleached sand and gravel. Free calcium and some magnesium carbonates are present.

The Palmyra soils are saturated when frost leaves the ground in spring, but they lose free water rapidly. Seldom are the soils saturated again during the growing season.

Although plants having a taproot send this root deeply into the substratum, most crops obtain their moisture mainly in the uppermost 30 inches of soil. This volume of soil can hold between 3 and 4 inches of available water. In nearly level areas the Palmyra soils can provide enough water to plants for about 2 weeks after a rain. In sloping or moderately steep areas, however, the soils may be droughty much sooner.

Palmyra gravelly loam, 0 to 3 percent slopes (PaA).—This nearly level soil occupies the tops of large outwash terraces. It is underlain by deposits, generally 30 to 70 feet thick, consisting mainly of gravel and partly of sand. The soil is most extensive just south and east of Batavia. Smaller acreages occur along Tonawanda, Black, and Oatka Creeks.

This soil is well suited to crops and is easily kept in favorable tilth. It has good moisture- and nutrient-supplying capacity. Improved drainage is needed only in a few small wet spots.

This soil has few limitations that affect nonfarm uses. (Capability unit I–2; woodland suitability group 1)

Palmyra gravelly loam, 3 to 8 percent slopes (PaB).—This gently sloping soil is mainly on outwash terraces, but it also occupies small terrace dunes scattered in larger areas of glacial till. In the southern part of the county, it occurs on small fans where side streams enter the main valleys. Most slopes are undulating. Small inclusions of moderately well drained Phelps soils are in terrace depressions and along the edge of terraces. Also included are small wet spots; these are shown on the soil map by a wet-spot symbol or as an intermittent stream.

This soil is among the most desirable in the county for all crops commonly grown. It can be kept in good tilth by use of proper management. The moisture- and nutrient-supplying capacity is good. Generally crops on the crests of small undulations show the effects of dry weather sooner than those in the rest of a field.

This soil has few limitations that affect nonfarm uses. (Capability unit IIe–2; woodland suitability group 1)

Palmyra gravelly loam, 8 to 15 percent slopes (PaC).—This moderately sloping soil is thinner in the upper subsoil than the typical one described for the series. Slopes are commonly irregular in rolling areas on kames, but they are generally uniform along the edges of outwash terraces. Small included areas are moderately eroded; these occur mainly on prominent crests or on terrace shoulders. Also included are spots of Palmyra fine sandy loam and small areas of Arkport soils.

This soil is suited to crops, pasture, or woodland. Deep-rooted crops ordinarily do better than others, for water is lost through runoff and the moisture-holding capacity is limited. Using some kinds of farm machinery is moderately difficult because of slope.

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This soil has only a few limitations that affect most nonfarm uses. (Capability unit IIIe–2; woodland suitability group 1)

Palmyra and Arkport soils, 15 to 25 percent slopes (PkD).—These moderately steep, well-drained soils are medium textured or moderately coarse textured. They generally occur in hilly areas that slope in more than one direction, but they also occupy the faces of outwash terraces or the steeper sides of sandy lacustrine deposits. A given area mapped as this unit may consist of Palmyra soils, Arkport soils, or some of both kinds.

These soils are eroded in some places, mainly on prominent crests where calcareous sand or gravel is within 10 inches of the surface. Generally, the material washed from these places accumulates at the foot of hills or between them. The supply of available moisture therefore varies widely from hilltops to adjacent depressions. Included with these soils are small areas of Chenango or Dunkirk soils.

Although the soils of this unit can be cropped, they are more suitable for pasture or woodland. Deep-rooted crops grow well for hay, but only an occasionally intertilled crop should be planted. Using farm machinery is difficult because of slope.

These soils are suitable for many nonfarm uses. (Capability unit IVe–1; woodland suitability group 1)

Palmyra and Arkport soils, 25 to 40 percent slopes (PkE).—The soils in this unit are most extensive along the east side of the Tonawanda Creek valley north of Attica, in an area between Attica and Darien, and in a band extending roughly east and west across the central part of the county.

These steep and very steep soils commonly occur together in places where glaciers deposited material erratically in kames. On terrace faces, however, the Palmyra soils may occupy nearly all of a given area mapped as this unit, and on the sides of lacustrine deposits, the Arkport soils may account for nearly all the acreage of a mapped area. Some areas are cleared of trees and are moderately eroded. Small inclusions of Dunkirk soils occur with the Arkport soils on lacustrine deposits. Also included are small areas of Chenango soils.

The soils in this unit are too steep for cultivation. Although some areas can be used for pasture, woodland generally is a better use.

These soils are possible sources of sand and gravel for construction, but in some places the material is too shaly for use as prime gravel. (Capability unit VIe–1; woodland suitability group 2)

Palmyra shaly silt loam, 0 to 3 percent slopes (PlA).—This nearly level soil occurs mainly between Batavia and Darien. It formed in glacial outwash having a higher content of calcareous shale and a lower content of limestone than the parent material of typical Palmyra soils. Consequently, it is somewhat darker colored throughout the profile than those soils, and it contains less sand and more silt and clay in the surface layer and subsoil.

This soil is highly productive. It is easily kept in good tilth and holds a favorable supply of nutrients and moisture available to plants.

The substratum of this soil has a high content of shaly gravel, which limits use of this material for prime gravel.

Nevertheless, the soil is good to excellent for most nonfarm uses. (Capability unit I–2; woodland suitability group 1)

Palmyra shaly silt loam, 3 to 8 percent slopes (PlB).—This gently sloping soil occurs mostly on terrace deposits between Batavia and Darien. It formed in glacial outwash containing more calcareous shale and less limestone than the parent material of typical Palmyra soils. As a result, this soil has a darker profile than those soils, and it contains less sand and more silt and clay throughout the surface layer and subsoil. Most slopes are undulating. Included are small areas of moderately well drained Phelps soils in depressions and along the edges of terraces. Also included are small wet areas, some of which are shown on the soil map as wet spots or as intermittent streams.

Almost all crops can be grown on this soil, but erosion control measures are needed for maintaining good tilth. The moisture- and nutrient-supplying capacity is good to excellent.

This soil has only a few limitations that affect most nonfarm uses. It contains too much shale for use in places where prime gravel is desired. (Capability unit IIe–2; woodland suitability group 1)

Palymyra shaly silt loam, 8 to 15 percent slopes (PlC).—This moderately sloping soil generally has an irregular surface because it occurs on rolling kames, but in some areas its slope is uniform. The glacial till in which the soil formed had a higher content of calcareous shale and a lower content of limestone than the parent material of typical Palmyra soils. Consequently, this soil is somewhat darker in the profile than those soils, and it contains less sand and more silt and clay in the surface layer and subsoil. The surface layer and upper part of the subsoil generally are not so thick as they are in typical Palmyra soils. Small included areas are moderately eroded and are somewhat more droughty than this soil. Also included are small areas of Arkport soils and of Mohawk soils.

This soil is suited to crops, pasture, or woodland. Because some rainwater is lost through runoff, deep-rooted crops generally do better than other crops, though more moisture is available to plants on this soil than on a Palmyra gravelly loam having similar slopes. Using some kinds of farm equipment is moderately difficult.

Nonfarm uses are limited mainly by slope. The gravelly substratum makes good fill material but generally contains too much shale for use as prime gravel. (Capability unit IIIe–2; woodland suitability group 1)

Phelps Series

Soils of the Phelps series are deep, medium textured, and moderately well drained. They formed in gravelly deposits that are stratified, but the proportion of sand, silt, and gravel varies widely from place to place. Slowly permeable layers in the substratum cause temporary wetness.

The surface layer of these soils is very dark grayish-brown gravelly loam, normally 6 to 10 inches thick. It is neutral, contains 4 to 6 percent organic matter, and has a moderate content of nitrogen, potassium, and phosphorus.

Underlying the surface layer is a subsurface layer of brown gravelly loam that may be faintly mottled. It extends to a depth of 10 to 15 inches. It is neutral and contains a moderate to small amount of phosphorus and potassium.

The subsoil is mottled brown gravelly light clay loam or gravelly loam. This layer extends to a depth of 20 to 36 inches. It is neutral and has a moderate content of potassium and phosphorus.

The underlying calcareous deposits consist of alternate layers of sand, silt, and gravel. The depth to compact glacial till ranges from 4 to 10 feet, and the depth to bedrock is 8 to 30 feet.

In April, these soils are saturated for very short periods, and 4 to 6 consecutive drying days are needed before plowing. In May, 2 or 3 drying days are enough. The water table does not fall so rapidly in these soils as it does in the Palmyra soils.

The Phelps soils have a moderate capacity for storing moisture. Normally, their root zone can hold between 3 and 5 inches of water available to plants.

Phelps and Fredon gravelly loams, 0 to 3 percent slopes (PrA).—This undifferentiated unit is made up of Phelps gravelly loam, Fredon gravelly loam, or both. In an area where both soils occur, the moderately well drained Phelps soil is on slight rises or lies along the edge of the area, adjacent to the better drained Palmyra soils, and the somewhat poorly drained Fredon soil is in low, nearly flat or slightly concave positions between the rises.

Wetness early in spring delays the planting of row crops, but the extent of delay depends on the amount of Fredon soil in a given area. If drainage is improved where needed, the soils are excellent for farming. The use of cover crops and adequate fertilizer permits continuous row cropping.

Nonfarm uses of these soils are limited mainly by wetness in spring. (Capability unit IIw–1; woodland suitability group 10)

Phelps gravelly loam, 3 to 8 percent slopes (PsB).—This gently sloping or undulating, moderately well drained soil is underlain by sand and gravel. Small included areas of Fredon soils lie in drainageways, and small inclusions of well-drained Palmyra soils are on the top of knolls or in higher areas adjacent to this soil.

This soil is suited to crops, pasture, or woodland. In some places random tiling is needed so that cultivated crops can be planted early in spring. Erosion is only a slight hazard, and crops respond well to good management. Limitations on the use of heavy machinery are only slight.

Nonfarm uses of this soil are slightly limited. (Capability unit IIe–4; woodland suitability group 1)

Remsen Series

The Remsen series consists of deep, nearly level to very steep, somewhat poorly drained soils that formed in fine-textured glacial till derived mainly from clayey shale. These soils contain a moderate amount of lime. They occur mainly in the southern and southwestern parts of the county.

In uneroded cultivated fields, the surface layer is very dark grayish-brown silt loam 5 to 10 inches thick. The

organic-matter content is moderate to high in nearly level areas but generally is lower in sloping areas. The layer contains a moderate amount of nitrogen. It is moderately acid to neutral and has a moderate supply of potassium and phosphorus.

Underlying the surface layer is a thin, mottled, light olive-brown subsurface layer that extends to a depth of 8 to 14 inches. In most places this layer is silt loam, but locally it is silty clay loam. It contains distinct mottles, which indicate that it is periodically wet. This layer is easily penetrated by roots, though it has low reserves of phosphorus and potassium. In some areas it has been removed by erosion or mixed into the plow layer.

Mottled gray clay or silty clay makes up the subsoil. Here, the Remsen soils have the highest clay content of any soils in the county. The material is arranged in strong blocks, and roots can penetrate along the faces of the blocks. This layer is periodically wet and is distinctly mottled. It is slightly acid to mildly alkaline. The supply of phosphorus is moderate; the reserve of potassium is high. The subsoil extends to a depth ranging from 20 to 40 inches.

The substratum is olive-gray shaly silty clay. In most places it is underlain by bedrock at a depth of 3 to 15 feet.

In April, free water normally is at a depth of 4 to 16 inches. At this time, 7 to 12 consecutive drying days are needed before the soil can be plowed. In May, free water is within 10 inches of the surface for only a short time after a rain, and the water table falls to a depth of more than 15 inches after a brief drying period. During this month, 5 to 8 consecutive drying days are needed before plowing. In June, 3 or 4 consecutive drying days are sufficient.

Plant roots are confined to the surface layer in spring, but they can extend to a depth of 20 inches as the growing season progresses. This 20-inch zone can hold between 3 and 4 inches of available moisture. In midsummer, crops on nearly level Remsen soils show a lack of sufficient moisture after 15 to 20 days without rain. The surface layer of these soils has a high capacity to absorb nutrients.

Remsen silt loam, 0 to 3 percent slopes (ReA).—This nearly level soil occupies areas that receive runoff from gently sloping Remsen, Darien, or Nunda soils. It is thicker in the surface layer and upper subsoil than other soils of the series, and in most places it is a little more poorly drained than other Remsen soils. Small inclusions of the poorly drained Madalin soils lie in lower adjacent areas or in wet spots. The wet spots are indicated by symbol on the soil map. Also included are small low-lying areas of poorly drained Ilion soils; small areas of moderately fine textured Darien soils; and, in places having a silty mantle, small areas of Burdett soils.

Row crops are difficult to grow on this soil unless drainage is improved. Some kinds of row crops show adverse effects of excess water after a heavy summer rain. The soil is suited to forage crops used in dairying. Water-tolerant grasses and legumes do fairly well.

Slow permeability and wetness are the major limitations affecting nonfarm uses of this soil. (Capability unit IIIw–1; woodland suitability group 16)

Remsen silt loam, 3 to 8 percent slopes (ReB).—This soil is gently sloping or undulating. In gently sloping areas, it commonly lies above more sloping Remsen soils in the more dissected parts of the plateau. Where the soil is undulating, it occupies nearly all of each area mapped except the drainageways, which contain small inclusions of poorly drained Madalin soils. Also included are small areas of somewhat poorly drained Burdett or Darien soils.

This is a fair to good soil for crops if it is drained and properly fertilized. Suitable legumes grow well, and so do other forage crops grown for dairy cattle. Slope is a slight limitation on the use of heavy farm equipment.

Nonfarm uses are limited mainly by very slow permeability and seasonal wetness. (Capability unit IIIw–4; woodland suitability group 16)

Remsen silt loam, 8 to 15 percent slopes (ReC).—This moderately sloping soil is underlain by fine-textured, shaly till. It lies on the crests of ridges and on the side slopes of the dissected plateau. Areas mapped on the plateau are below areas of less sloping Remsen soils. This soil has a thinner subsurface layer than that in a typical Remsen soil. Small areas of Darien or Nunda soils are included.

Suitable row crops can be grown on this soil, but erosion is a severe hazard. Excess water is of less concern than on less sloping Remsen soils, though drainage is somewhat poor. Limitations on the use of heavy machinery are moderate.

Nonfarm uses are limited mainly by slow permeability and seasonal wetness. (Capability unit IIIe–5; woodland suitability group 16)

Remsen silty clay loam, 3 to 8 percent slopes, eroded (RmB3).—This gently sloping or undulating soil commonly lies above more sloping Remsen soils in the more dissected parts of the plateau. In undulating areas it occupies the higher knolls. This soil has lost its original surface layer through erosion. Its plow layer, which contains clayey material from the subsoil, is finer textured and less friable than that of uneroded soils in the Remsen series. In addition, this soil can hold considerably less moisture available to plants than those soils. Small areas of uneroded, more nearly level Remsen soils are included.

Row crops do poorly on this soil, especially in drier years. Seed germination is uneven and poor. Suitable legumes or other sod crops should be grown. Slope is a slight limitation on the use of heavy equipment.

Nonfarm uses are limited mainly by very slow permeability and periodic wetness. (Capability unit IIIe–8; woodland suitability group 16)

Remsen silty clay loam, 8 to 15 percent slopes, eroded (RmC3).—This moderately sloping soil occurs in areas of fine-textured, shaly glacial till. It lies on the crests of ridges and on the side slopes of the dissected plateau. The original surface layer has been washed away, and the plow layer contains material from the clayey subsoil that makes it finer textured and less friable than the surface layer of uneroded Remsen soils. Also, the capacity to hold available moisture is considerably lower in this soil than it is in those soils.

Row crops do poorly on this soil. Their seeds germinate at a low and uneven rate. Sod crops, especially suitable legumes, should be grown. Because of slope, limitations on the use of heavy equipment are moderate.

For nonfarm uses of this soil, slow permeability and moderate slopes are the major limitations. (Capability unit IVe-5; woodland suitability group 16)

Remsen silty clay loam, 8 to 25 percent slopes, severely eroded (RmC4).—This moderately sloping to moderately steep soil is in areas of fine-textured, shaly glacial till. In most places the original surface layer and the upper half of the subsoil have been lost through erosion. Gullies have been cut deeply into the lower subsoil and the substratum. Small areas of less eroded Remsen soils are included.

This soil should be permanently covered with sod or trees. Tree seedlings can be planted by machine on about three-fourths of the acreage. Hand planting may be needed on the more severely eroded spots. Getting plants to grow on this soil is difficult.

Nonfarm uses are limited mainly by slope and the risk of erosion. (Capability unit VIIe 2; woodland suitability group 22)

Remsen silty clay loam, 15 to 25 percent slopes, eroded (RmD3).—This moderately steep soil occurs in areas of fine-textured, shaly glacial till on the dissected plateau. It is generally somewhat poorly drained but in some places is moderately well drained. In most of the cleared areas, the original surface layer has been removed through erosion, and material brought up from the clayey subsoil makes the plow layer finer textured and less friable than the surface layer of uneroded Remsen soils. The available moisture capacity is very low in this soil. Small included areas are wooded; in these the surface layer, subsoil, and substratum are similar to those described for the series, though the surface layer and subsoil are somewhat thinner than they are in most places.

Row crops do very poorly on this soil, and only poor to fair growth is obtained from suitable legumes used for long-term hay or pasture. The soil should be returned to trees wherever possible. Limitations on the use of heavy machinery are severe.

Nonfarm uses are limited mainly by slow permeability and moderately steep slopes. (Capability unit VIe-2; woodland suitability group 16)

Remsen soils, 25 to 40 percent slopes (RnE).—These soils occupy areas of fine-textured, shaly glacial till. They lie on the steep and very steep side slopes of the dissected plateau. The texture of their surface layer is silt loam or silty clay loam. Where the soils have been cleared, their subsurface layer is very thin or lacking. In wooded areas, however, this layer can be easily seen in the profile and is mottle free in small areas that are moderately well drained. Small inclusions of strongly acid Hornell soils were mapped.

These Remsen soils are suited to pasture or woodland. Pasture plants recover slowly from grazing, however, and accelerated erosion is likely if the plants are overgrazed. Wherever possible, the soils should be returned to trees.

For nonfarm uses of these soils, the major limitations are steep or very steep slopes and the high content of clay in the subsoil. (Capability unit VIIe-1; woodland suitability group 9)

Remsen soils, 25 to 40 percent slopes, severely eroded (RnE4).—These soils are on steep and very steep side slopes in areas of fine-textured, shaly glacial till. In most places they have lost their original surface layer and the upper half of their subsoil through erosion. The present surface layer normally is silty clay or shaly silty clay. Gullies have been cut into the substratum. Small areas of less eroded Remsen soils are included.

These severely eroded Remsen soils are difficult to protect from uncontrolled runoff. They cannot be used for any shallow-rooted crops, but they are suited to some kinds of trees. Seedlings should be planted by hand in the better areas remaining, such as spots between the gullies. Only the species most tolerant of drought should be planted.

The high content of clay, the erosion hazard, and steep or very steep slopes are severe limitations affecting nonfarm uses of these soils. (Capability unit VIIe-2; woodland suitability group 22)

Rhinebeck Series

The Rhinebeck series consists of somewhat poorly drained, medium-textured soils that formed in material deposited in glacial lakes during the last advance of ice. These soils have a medium content of lime. Most of their acreage is in the basins of Tonawanda and Oak Orchard Creeks.

The surface layer is very dark grayish-brown silt loam 6 to 10 inches thick. It is friable, is slightly acid or neutral, and contains a moderate supply of organic matter. Its content of nitrogen, potassium, and phosphorus is moderate.

In undisturbed areas the surface layer is underlain by a subsurface layer of leached, distinctly mottled, grayish-brown silt loam. This friable layer is slightly acid or neutral and has moderate reserves of phosphorus and potassium. It extends to a depth of 11 to 15 inches. In cultivated fields the subsurface layer has been mixed into the plow layer in some places.

The subsoil is mottled, dark grayish-brown or olive-brown silty clay loam to silty clay. It is neutral or mildly alkaline and is more compact than the layers above it. The supply of potassium is high, and that of phosphorus is moderate.

The substratum is made up of grayish, calcareous material that ranges from silt loam to silty clay in texture. Generally, it is less compact than the subsoil.

The Rhinebeck soils are wet for a short to moderate period after flooding or runoff has ceased in spring. The water table does not fall rapidly, and it seldom goes below a depth of 10 to 15 feet, even in the drier part of the year. These soils can be row cropped, but they may need improved drainage, especially in wetter areas along the old stream channels. Their moisture-supplying capacity is nearly as high as that of the adjacent Eel and Genesee soils.

Rhinebeck silt loam (Ro).—This soil is nearly level, stone free, and somewhat poorly drained. Most of it occupies broad areas in the basins of Tonawanda and Oak Orchard Creeks. A smaller acreage is in other valleys. The soil commonly lies next to the main stream, where it adjoins the Genesee or Eel soil and is slightly below the Madalin soil, which generally occurs some distance from the stream. Common inclusions are small, higher areas of somewhat similar but moderately well drained soils.

This soil can be used for row crops if it is drained. The response to tiling is fair to good. Flooding is a hazard about 1 year in 15.

Nonfarm uses are limited mainly by slow permeability and the risk of flooding. (Capability unit IIIw-1; woodland suitability group 16)

Rockland, Limestone

Rockland, limestone (Rr) generally consists of soil material 2 to 6 inches thick over limestone bedrock. In at least one-fourth of the acreage, limestone crops out. The soil material ordinarily is very cherty loam that has a high base status. The limestone bedrock lies in nearly horizontal beds and, in some places, has a high content of flint. In some areas there are fractures in the limestone 1 to 2 inches wide and 2 to 4 inches deep. These fractures are spaced 6 to 15 feet apart and are filled with soil material. Small areas of Benson soils are commonly included.

This land type is not suitable for farming, but it can be used as habitat for wildlife. Trees do poorly except in areas of included Benson soils. Quarrying is extensive.

Hard limestone near the surface is the major limitation affecting nonfarm uses. (Capability unit VIIIs-1; woodland suitability group 22)

Romulus Series

In the Romulus series are deep, poorly drained, slightly acid to mildly alkaline soils that formed mainly in reddish, moderately fine textured till. These soils lie in flat or depressional areas and are adjacent to the Cazenovia and Ovid soils, which formed in similar material but are not so poorly drained. Romulus soils receive much runoff from these and other nearby soils.

The surface layer, generally 8 to 10 inches thick, is very dark gray to black silt loam that has a high organic-matter content. In some areas it is covered with material that washed from higher soils and is more than 10 inches thick. This layer is porous, can hold a good supply of moisture, and permits good root development. Because drainage is poor, roots are confined mostly to this layer.

Below the surface layer is a thin, gray, leached subsurface layer that contains brown mottles. It normally extends to a depth of 12 to 18 inches, but in cultivated fields it may be mixed into the plow layer. The gray color indicates that the subsurface layer is wet for many months at a time. It is moderately porous and, in drained areas, can be penetrated by roots.

The subsoil is nearly neutral, reddish-brown to brown silty clay loam or heavy clay loam that contains many mottles. It extends to a depth of 24 to 40 inches. Because this layer ordinarily is wet, only a few roots penetrate it. In drained areas, however, the blocky arrangement of the soil material allows roots to penetrate between the blocks. A moderately high potassium reserve is associated with the clay in this layer. The phosphorus-supplying power is medium.

The substratum is firm, calcareous, reddish-brown to brown glacial till that ranges from heavy loam to clay loam or silty clay loam in texture.

In April, the water table is within a few inches of the surface much of the time. It remains within 15 inches of the surface during much of May. As the growing season progresses, the water table falls to a depth of more than 15 inches in dry periods, and it usually recedes quickly after a rain. If rainfall is heavy, however, the ground water approaches the surface. Consequently, the Romulus soils can rarely support farm machinery until June.

Because these soils are wet so much of the time, they usually contain more water than plants can use. Owing to the high content of organic matter, the surface layer has a very high capacity to absorb nutrients and lime. Generally, however, the requirement for lime is low. The reserve of nitrogen and potassium is moderately high, and the supply of phosphorus is moderate.

Romulus silt loam (Rs).—This nearly level soil occupies low areas that receive runoff from higher slopes. Small inclusions of Ovid soils are on slight rises within larger areas of this Romulus soil. Also included are some wetter, mucky spots; these are indicated by wet-spot symbol on the soil map.

Unless this soil is drained, it is too wet for row crops. It can be drained fairly well by tiling. Surface ditching generally improves drainage to the extent that suitable legumes can be grown for hay.

For nonfarm uses of this soil, prolonged wetness and slow permeability are major limitations. (Capability unit IVw-2; woodland suitability group 20)

Schoharie Series

The Schoharie series consists of deep, nearly level to steep, well drained or moderately well drained soils that formed in clay and silt laid down in glacial lakes. These soils are among the reddest and finest textured in the county. They occur mainly north of State Route 5 adjacent to Black Creek and, to a lesser extent, along the north side of the Onondaga escarpment in the western part of the county.

In areas that are cultivated but uneroded, the surface layer is neutral, dark-brown silt loam 5 to 10 inches thick. This layer has a moderate content of organic matter and contains a moderate supply of nitrogen. It has high water-holding capacity and a moderate supply of available potassium and phosphorus. The surface layer is underlain by a subsurface layer of pale-brown silt loam.

The subsoil is neutral or mildly alkaline, reddish-brown silty clay or clay that is arranged in blocks. These permit roots and water to penetrate well into the layer. Associated with the clay is a moderately high content of potassium. The supply of phosphorus is moderate.

The calcareous substratum is dominantly silty clay but includes thin layers of silt and very fine sand. This layering indicates that the soil material is lake laid. The substratum is generally unstable.

In most areas the Schoharie soils remain saturated for short periods after rainfall in April and May. During April, 6 or 7 consecutive drying days are needed before the soil can be plowed. In May, 4 or 5 consecutive drying days are needed, and in June, 2 or 3 days are sufficient. If the soils are worked when wet, their good structure can be severely harmed.

The root zone of most crops is within the topmost 18 to 24 inches of soil. This volume can hold between 5 and

7 inches of water available to plants. Much of the water is not readily available, however, and crops growing in summer show signs of moisture deficiency after 10 to 12 days without rain.

The surface layer in cultivated fields has a high capacity to absorb nutrients and lime. Its natural content of lime is moderately high. Erosion is generally a severe hazard, and the control of soil losses is the chief management concern.

Schoharie silt loam, 1 to 6 percent slopes (SeB).—This soil is in broad, nearly level and gently convex areas that receive no runoff from adjacent slopes. It is underlain by lake-laid deposits of reddish clay. Commonly adjoining it are more strongly sloping Schoharie soils. Small inclusions of somewhat poorly drained Odessa soils occupy nearly level and gently sloping lower areas that receive runoff from this soil. Also included are small areas of moderately eroded Schoharie soils and, in places where reworked glacial till is conspicuous in the profile, small areas of Cazenovia and Ovid soils.

This soil is suited to most crops. If it is tilled when too wet, however, it is likely to lose its favorable structure, especially if row crops are grown continuously. Seed germination is poor in the eroded areas that are included.

Slow permeability is the chief limitation affecting nonfarm uses of this soil. (Capability unit IIe–6; woodland suitability group 8)

Schoharie silty clay loam, 6 to 12 percent slopes, eroded (ShC3).—This moderately sloping soil occurs mainly on the sides of clay deposits in the Black Creek basin north of Horseshoe Lake. It generally has short slopes, but it receives runoff from higher soils and has lost much of its original surface layer through erosion. The plow layer contains enough of the clayey subsoil that it is finer textured, is less friable, and holds considerably less moisture available to plants than the surface layer in uneroded Schoharie soils. Included with this soil are small areas of Odessa soils in the drainageways, and scattered spots of Cazenovia soils.

This soil is poorly suited to row crops. It should be used for sod crops, especially suitable legumes. Limitations on the use of heavy machinery are moderate.

Nonfarm uses are limited mainly by slow permeability and by unstable layers in the substratum. (Capability unit IVe–5; woodland suitability group 8)

Schoharie silty clay loam, 12 to 20 percent slopes, eroded (ShD3).—This moderately steep soil occupies the sides of reddish, clayey lake deposits. Generally, most of its original surface layer has been washed away, and its plow layer contains material from the clayey subsoil that makes it finer textured and less friable than the surface layer of uneroded Schoharie soils. In addition, the amount of moisture available to plants is considerably less. Included with this soil are small areas of Cazenovia soils and, adjacent to Black Creek, some clay escarpments or landslips.

This soil is not suited to row crops, but it can be used for sod crops, especially suitable legumes. In places where pasture or hay is not needed, the soil should be returned to trees. Limitations on the use of small machinery are moderate, and on heavy implements, severe.

For nonfarm uses of this soil, the major limitations are slow permeability in the subsoil, instability of the soil material, and moderately steep slopes. (Capability unit VIe–2; woodland suitability group 8)

Schoharie soils, 20 to 40 percent slopes, eroded (SIE3).—These soils are on the steep and very steep sides of reddish, clayey lake deposits. Most of the acreage is in areas facing Black Creek north of Horseshoe Lake. Slopes generally are short. Erosion has removed much of the original surface layer, and the plow layer consists partly of clayey material brought up from the subsoil. Generally, the plow layer is silty clay loam or silty clay. Included with these soils are small wooded areas in which the original surface layer of silt loam is undisturbed and is underlain by a leached subsurface layer 2 to 5 inches thick. Also included are small areas of Cazenovia soils and, adjacent to Black Creek, some clay escarpments or landslips.

About half the acreage of these Schoharie soils is wooded or is covered with second-growth brush and small trees. The rest is pastured or idle. Pastures are poor, and applying nutrients to them is difficult. Rainwater is taken in slowly, and most of it runs off to lower areas. Generally, the soils should be used as woodland or as habitat for wildlife.

Nonfarm uses are severely limited because permeability in the subsoil is slow and slopes are steep or very steep. (Capability unit VIIe–1; woodland suitability group 9)

Scio Series

In the Scio series are deep, moderately well drained, nearly level and gently sloping soils that formed in 20 to 30 inches of silt deposited over silt, sand, gravel, or glacial till. These soils are moderately acid or strongly acid throughout the profile. They lie in the lower basins of Tonawanda and Murder Creeks.

The surface layer is very dark grayish-brown, moderately acid silt loam 7 to 10 inches thick. This layer contains a moderate amount of organic matter. It is permeable to air, roots, and water, and it has a moderate content of potassium and phosphorus.

The subsoil is yellowish-brown, strongly acid silt loam that is distinctly mottled at a depth of 16 to 18 inches. It permits good root development and is well drained in the upper part. Below a depth of 16 to 18 inches, however, this layer is periodically saturated. It is poorly supplied with potassium and phosphorus. The subsoil extends to a depth of 20 to 30 inches.

The substratum generally is moderately acid to neutral, brown, stratified sand, silt, and gravel, but locally it is glacial till. This layer may differ markedly in composition from the overlying layers.

After each rain in April, free water stands within 10 inches of the surface for a short time. It falls quickly during dry periods, however, and at times is more than 30 inches below the surface. In April, 4 to 6 consecutive drying days are needed before the soil can be plowed. During May, 3 or 4 consecutive drying days are sufficient before plowing, and in June, only 1 or 2 days are needed.

The main root zone in Scio soils is confined to the uppermost 24 to 28 inches. This volume of soil can hold between 4 and 6 inches of water available to plants. In summer, crops show signs of moisture deficiency after 12 to 15 days without rain.

The plow layer has a moderate capacity for absorbing

nutrients and lime. In unlimed areas the requirement for lime is relatively high. Nevertheless, these soils are potentially productive of vegetable crops and crops used in dairying.

Scio silt loam, 2 to 8 percent slopes (SmB).—This acid, moderately well drained soil is stone free, but commonly it contains layers of very fine sandy loam. Included with it, along lower adjacent drainageways, are small areas of somewhat poorly drained Niagara soils. Also included are small areas of Galen or Elnora soils and of Collamer soils.

Most crops can be grown on this soil, and truck crops do well, but lime is needed in large amounts. Included wet spots may require improved drainage. The response to tiling is good.

For nonfarm uses, a seasonally high water table is the major limitation. (Capability unit IIe–5; woodland suitability group 6)

Sloan Series

In the Sloan series are very poorly drained, medium-textured, high-lime soils that formed in alluvial material. These soils occupy first bottoms, generally farther from the main stream than better drained soils that formed in alluvial deposits. Sloan soils occur in small, narrow bands along abandoned stream channels or in other wet areas along the larger streams. They are covered with fresh fine-textured material each time they are flooded.

The surface layer is very dark gray silt loam 10 to 13 inches thick. It is neutral to alkaline and has a moderately high organic-matter content. The supply of nitrogen, phosphorus, and potassium is high.

Underlying the surface layer is a neutral to alkaline, dark-gray, distinctly mottled layer that is silt loam in most places but ranges to light silty clay loam. It is more olive and contains fewer mottles than the corresponding layer in the Wayland soils.

The substratum consists of varved layers of grayish silt and lenses of very fine sand or clay. This material is calcareous.

The Sloan soils remain inundated for long periods after flooding in spring. About the only farm use for which they are suitable is limited summer pasture.

Sloan silt loam (Sn).—This very poorly drained soil lies in the valleys of streams. In narrow valleys it adjoins the stream, but in the wider valleys it occupies low areas away from the stream. Commonly, it is in oxbow channels that have been partly filled with soil material. In some places it is underlain by gravel at a depth of 3 to 5 feet. Where the soil has been cleared, the profile is similar to that of the Wayland soils, which lie closer to the stream, but in wooded areas the surface layer is covered with black muck, which is lacking in the Wayland soils. Small areas of these soils are included.

Generally, the only uses for this soil on farms are limited pasture in summer and habitat for some kinds of wildlife. Because the soil normally occupies such low positions, it is difficult to drain. The only trees that will grow are adapted wetland species.

For nonfarm uses of this soil, flooding and extreme wetness are the major limitations. (Capability unit VIIw–1; woodland suitability group 21)

Stafford Series

The Stafford series consists of somewhat poorly drained, nearly level, coarse-textured soils that formed in sandy lake or windblown deposits. These soils occur mainly in the lower Tonawanda and Black Creek basins.

The surface layer in cultivated fields is very dark grayish-brown loamy fine sand 6 to 10 inches thick. It has a moderately high content of organic matter and contains a good supply of nitrogen, though the nitrogen is released slowly in spring. This layer is porous, permits good root development, has fair water-holding capacity, and in unlimed areas is strongly acid or moderately acid. The content of potassium is low; that of phosphorus, moderately low.

The subsoil is firm, brown to grayish-brown loamy fine sand that contains a moderate amount of distinct mottles. This layer is waterlogged for a considerable time in spring. Because it is sandy, it readily permits water to move laterally. It has a low content of nutrients and is strongly acid or moderately acid.

The substratum is mainly firm, light-gray, distinctly mottled fine sand, but it grades into layers of contrasting texture at a depth ranging from 3 to 10 feet. Bedrock occurs at a depth of 4 to 30 feet.

Stafford soils are saturated when frost leaves the ground in spring. During April, free water is at a depth ranging from 4 to 15 inches. At this time, 6 to 9 consecutive drying days are needed before the soil can be plowed.

In May, free water is within 8 inches of the surface during rainy periods, but it falls to a depth of 20 inches or more after several days of dry weather. During this month, 4 to 6 consecutive drying days are needed before plowing. In June, 2 or 3 drying days are sufficient.

In spring the roots of plants are confined mainly to the surface layer. As the growing season progresses, however, they extend to a depth of as much as 30 inches. In most areas roots grow chiefly in the uppermost 15 to 24 inches of soil. This volume can hold between 2 and 3 inches of water available to plants. During dry periods in summer, all crops show signs of moisture deficiency after 9 to 14 days without rain. Shallow-rooted crops do well on these soils. The surface layer has a moderate capacity to absorb nutrients and lime.

Stafford loamy fine sand, 0 to 2 percent slopes (StA).—This nearly level soil is wet for moderate periods in spring. It commonly adjoins the moderately well drained Elnora soils, and small, slightly higher areas of these soils are included. Also included, in depressions that are ponded in spring, are small areas of the poorly drained or very poorly drained Lamson soils. Some inclusions of Lamson soils are indicated on the soil map by wet-spot symbol.

Late-planted crops do fairly well on this soil in drier growing seasons. Although natural fertility is very low, the soil is productive if it is adequately drained and fertilized. Drainage outlets are difficult to establish because the surface is so nearly level. Tile lines need wrapping to prevent sand from entering them at the joints. Where the soil is drained and well managed, truck crops grow well. In cleared fields, however, soil blowing is a hazard if the surface is dry.

The major limitations for nonfarm uses are wetness in

spring and lack of stability in the wet sand. (Capability unit IIIw-3; woodland suitability group 14)

Warners Series

Soils of the Warners series are poorly drained or very poorly drained. They developed in mucky mineral material that is less than 18 inches thick and is underlain by marl. Most of the acreage is in low areas in the Bergen Swamp and in pockets between the villages of Bergen and Le Roy.

The surface layer generally is very dark gray loam or silt loam that has a high organic-matter content. It overlies white or light-gray, friable, highly calcareous marl. In some places the upper part of this material has solidified into porous, hard, chalky limestone. The marl ranges from 4 to 10 feet in thickness and is underlain by various mineral materials.

Warners loam (Wr).—This nearly level soil is used mainly for woodland or wildlife cover, though selected areas can be used for pasture. Wetness is the major limitation, for the soil lies in areas that are difficult to drain. In some places the marl is excavated and used as lime.

Nonfarm uses of this soil are limited chiefly by wetness and unstable marl. (Capability unit VIIw-2; woodland suitability group 21)

Wayland Series

The Wayland series consists of deep, poorly drained, nearly level soils that formed in recent alluvial deposits. These soils show little or no development of differing horizons. They occur on the flood plains of Oatka, Black, and Tonawanda Creeks, as well as along smaller streams in the county.

The surface layer is very dark grayish-brown or very dark gray silt loam in which there are rust-colored mottles along root channels and wormholes. This layer is 8 to 10 inches thick. Almost annually, it receives fresh material that is laid down by flooding streams. The organic-matter content is high, and the potassium- and phosphorus-supplying power is moderate. In undrained areas the layer is poorly aerated and contains roots only in the top 8 inches.

Underlying the surface layer is a dark-gray or very dark grayish-brown, distinctly mottled layer of silt loam or light silty clay loam that is neutral to weakly calcareous. Although it differs from the surface layer only slightly in color and texture, this layer contains considerably less organic matter. In undrained areas it is poorly aerated and is not penetrated by roots, but if drained it is porous to air and roots. The layer is neutral in most places and has a moderate capacity to supply potassium and phosphorus. It extends to a depth ranging from 15 to 30 inches.

The lower part of the profile is more grayish than the overlying parts, and this indicates that the layer, in undrained areas, is waterlogged practically all year. In texture it ranges from silt loam to silty clay loam. Because the layer is wet and unaerated, it is not penetrated by roots. It is neutral to slightly calcareous and is moderately supplied with phosphorus and potassium. It extends to a depth ranging from 30 to 40 inches.

Mottled or grayish layers of sand, silt, or clay make up most of the substratum. The grayish colors indicate gleying, or reduction of iron compounds. In many areas there are areas of bluish-gray clayey material, and in places gravel occurs in layers of varying thickness. The depth to the different layers varies widely. Generally, the substratum is calcareous.

The Wayland soils are subject to flooding in spring. Except during long dry periods of summer, the water table generally is near or at the surface. In some places where the water table falls to a reasonable depth, these soils can be drained and cropped, but mainly they are suited to pasture or trees.

Wayland silt loam (Wa).—This nearly level soil occupies low areas on flood plains, where it is flooded every spring. Included with it, on adjacent thicker and slightly more elevated alluvial deposits, are small areas of moderately well drained Eel soils. Also included, in old oxbow drainageways, are small areas of very poorly drained Sloan soils.

In undrained areas pasture is a good use for this soil. Row crops cannot be successfully grown unless drainage is improved, but suitable outlets for tile drains may be difficult to establish. Flooding is a hazard during heavy thundershowers in midsummer.

Nonfarm uses of this soil are severely limited. Flooding is the main limitation. (Capability unit IVw-3; woodland suitability group 20)

Formation, Morphology, and Classification of Soils

Soils are the products of soil-forming processes acting upon material deposited or accumulated by geologic forces. The five factors that affect the formation of soils are parent material, plants and animals, climate, relief, and time.

Factors of Soil Formation

Climate and living organisms, particularly vegetation, are the active forces of soil formation. Their effect on parent material is modified by relief and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. In a few places, one factor dominates and fixes most of the properties of the soil, but normally the interaction of all five factors determines the kind of soil that developes in any given place.

Parent material

The soils of Genesee County developed from four different kinds of parent material. Of these kinds, the most extensive is glacial till. The others are glacial outwash, deposits laid down by wind or water, and organic deposits. The main characteristics of the parent material that affect the soils in the county are texture, color, carbonate content, shale content, and position in the landscape.

Glacial till is a mixture of soil material and rock rubble that was laid down by ice, much the same as though it were deposited by a giant bulldozer. The mineralogy of

the till was influenced by the nature of the underlying rocks that the glacier scoured as it moved across the countryside. Material from the underlying rock was picked up, well sorted, and generally transported to the south, where it again was deposited. Soils such as the Ontario and Lansing are from this well-mixed till. In other areas a relatively thin mantle of silty windblown material was deposited over contrasting glacial till consisting dominantly of shale. Here, the Nunda and Burdett soils were formed. Other areas showed little effect of glacial movement, and the till was similar to the underlying bedrock. The Remsen, Hornell, and Mohawk soils are shaly throughout, for the till in which they formed was derived mainly from the underlying shale.

The glacier was the source of melt water that formed large rivers near the ice front. These rivers sorted out the fine material, and they moved gravel and sand downstream and left them as glacial outwash. The mineralogy of the deposit depended on the kind of rock material carried by the stream. The Palmyra and Phelps soils formed in outwash made up chiefly of limestone or calcareous shale, whereas the Chenango soils formed in acid, shaly outwash.

The effect of glaciation did not stop with the deposition of gravel and sand. Between the glacier to the north and the generally higher land to the south, melt water was trapped and formed glacial lakes. Sandy material was deposited in deltas near the edge of the lakes, and in this material the Arkport and Colonie soils formed. Silt and clay were carried toward the center of the lakes, but eventually they settled in still water as lacustrine deposits. The Dunkirk and Collamer soils formed in the silty deposits, and the Schoharie and Odessa soils formed in the clayey ones.

Since the glacial period, overflowing streams have deposited fresh, dark-colored alluvial material in the valleys. This alluvium is the parent material for the Genesee, Eel, and Holly soils. These are commonly called soils of the first bottoms.

Geologically, the parent material in the county is relatively young. Essentially all of the mineral deposits were laid down at about the end of the last ice age, or about 11,000 years ago. Alluvium is still deposited along the streams from time to time.

Saturated bogs cover large areas in Genesee County, mainly in the northern part. Here, muck soils have formed in the partially decomposed remains of trees and other plants.

Plant and animal life

Genesee County originally was nearly all forested, except in a small area of fresh water marsh. The trees consisted mainly of hardwoods, but there also were a few conifers. Many of the soils have a thin, dark-colored A1 horizon and a thin, leached A2 horizon. These horizons indicate that the soils formed under forest.

Most hardwoods use large amounts of calcium and other bases if they are available. The loss of bases through leaching is largely prevented because trees take up the nutrients and then return them to the soil surface each year when the leaves fall.

Vegetation supports whatever animal life is present in the soil. Earthworms and larger burrowing animals make the soil more permeable to air and water. Their waste products cause aggregation of soil particles and improve soil structure. The formation of organic acids by the action of bacteria and fungi on leaf litter is prevalent in most of the forested areas remaining. This causes the surface layer of some soils to be much more acid than the subsoil.

Man's activity has brought about significant changes in many soils of the county. Tillage has accelerated erosion in many areas. Clearing, artificial drainage, and the introduction of new plants have affected soil development. In cultivated fields the organic-matter content in the surface layer has been altered, and in many places the A2 horizon has been destroyed. The microbiology of the soil is changed by the continued use of lime, fertilizer, and pesticides.

Climate

Genesee County has a humid, temperate climate, but Lake Ontario and Lake Erie temper the extremes of summer heat and winter cold. Climatic data for the county are given in the section "General Nature of the County."

Temperature and rainfall influence the rate and kind of weathering and leaching. In Genesee County the climate is nearly uniform throughout and does not vary enough to account for differences among the soils. This humid, temperate climate tends to develop moderately weathered, leached soils.

Relief

The shape of the land surface, the slope, and position in relation to the water table have had a great influence on formation of soils in the county. High-lying soils having convex slopes lost part of their rainfall to soils in lower areas. This can cause a sizable difference in the amount of water that is taken into the soils in different parts of the landscape. The soils in lower areas generally remain waterlogged, or they have a water table closer to the surface than the soils in adjacent higher areas. Commonly, the surface layer in low, wet soils has a higher organic-matter content than the one in better drained soils. The organic matter accumulates because excess water slows the rate at which plant residues are decomposed by micro-organisms.

Soils that formed in one kind of parent material but have different characteristics because of differences in degree of wetness make up a sequence called a drainage sequence. For example, the Lansing, Conesus, Appleton, Lyons, and Alden soils are members of a drainage sequence. Drainage ranges from good in the Lansing soils to very poor in the Alden soils.

Time

Geologically, the deposits of soil materials in the county are relatively young. Most of the materials were left after the last glacier melted, about 11,000 years ago. The soils formed since the last glaciation, and those on recent alluvium are very young. All the soils have not reached the same stage of profile development, however, because other soil-forming factors have influenced the rate and kind of development in the various soils.

The Kendaia, Mohawk, and Marilla soils are among

the oldest in the county. Soils such as the Scio and Rhinebeck are somewhat less than 11,000 years old, and the Genesee and Eel soils are the most recent in origin.

Morphology of Soils

If a vertical cut is dug into a soil, several layers, or horizons, are evident. The differentiation of horizons is the result of many soil-forming processes. The most important of these are the following: (1) Physical weathering, such as thawing and freezing, (2) leaching of salts that are more or less soluble, (3) accumulation of organic matter, (4) chemical weathering of primary minerals or rocks into silicate clay minerals, (5) translocation of silicate clay mineral from one horizon to another by percolating water, (6) accumulation of some iron colloids, and (7) formation of dense or compact layers in the subsoil.

Some of these processes take place in all the soils, but the number of active processes and the degree of their activity vary from one soil to another.

In all of the mineral soils, some organic matter has accumulated to form an A1 horizon. In wooded areas these mineral soils have an organic horizon at the surface, and this is designated as an O1 or O2 horizon, depending on the extent to which the organic material has decomposed. If the soils are cleared and plowed, their organic and A1 horizons lose their identity as they are mixed into the plow layer, which is called an Ap horizon. This horizon is enriched in organic matter and generally is distinct from the underlying horizons because it is darker and more friable. The Canandaigua and Lyons soils are examples of soils that have a distinctive, dark-colored Ap horizon. Only in the recent alluvial soils is there no sharp contrast between the A1, or the Ap, horizon and the next underlying horizon.

The upper horizons of a soil normally are more leached of bases and silicate clays than the lower horizons. The leached part of the A horizon that is too far below the surface to be influenced by surface organic matter is called the A2 horizon. Normally, it is the lightest colored horizon in the soil. It is well expressed in such soils as the Dunkirk and Lansing.

In soils having a B horizon of clay accumulation, the clays removed from the A horizon are immobilized in what is designated as the B2t horizon. Of all the horizons in the soil, this one contains the highest concentration of clay and is the brownest. The Conesus, Hilton, and Palmyra are among the soils that have a well-expressed B2t horizon.

The subsoil of some soils includes a distinct zone of yellowish brown that differs little or none in texture from the A horizon. This zone is called a color B horizon. The Manlius and Scio soils have a strong color B horizon.

Characteristics that indicate relative wetness, or class of drainage, are evident in soils. Excess water commonly produces mottles, or a pattern of colors, dominantly gray. The extent of mottling indicates the degree of gleying, or the process of chemical reduction and transfer of iron. A gley soil normally is gray or bluish gray. Locally, soil layers of this color are called blue clay, a name given to soil material excavated from many pond sites.

In soils that are well aerated, brown or yellowish brown is the normal color. A soil is considered well drained if it is free of mottles to a depth of at least 20 inches and shows only brown colors. Among the well-drained soils in this county are the Manlius and Honeoye. Ordinarily, moderately well drained soils are wet for short periods and are free of mottles to a depth of 16 to 20 inches. If the soils have a temporary perched water table, however, the A2 horizon contains a few mottles, though the upper part of the B horizon is essentially mottle free. The Scio and Hilton soils are examples of moderately well drained soils.

In areas where the soils are wet for long periods of time and are considered poorly drained, the A2 horizon shows the effect of moderate or intense reduction of iron. This horizon is dominantly gray but contains a few brown mottles. Within some areas of poorly drained soils, there are small depressions that remain saturated most of the year unless they are artificially drained. Here, drainage is very poor, the surface layer has a high organic-matter content, and the soils are termed mucky. The Lamson and Canandaigua soils are examples of poorly drained and very poorly drained soils.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us in understanding their behavior and their response to manipulation. First through classification and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*11*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available (*8, 13*). In table 10, the soil series of Genesee County are placed in some categories of the current system and in the great soil groups and orders of the older system. Placement of some soil series in the current system of classification may change as more precise information becomes available.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode or origin, are grouped together. The classes that make up the current system are briefly defined in the following paragraphs.

TABLE 10.—*Soil series classified according to the current system of classification and the 1938 system with its later revisions*

Series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Alden	Fine-silty, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Humic Gley soils	Intrazonal.
Allis	Fine, illitic, acid, mesic	Aeric Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Angola	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Appleton	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Arkport	Coarse-loamy, mixed mesic.	Psammentic Hapludalfs.	Alfisols	Sols Bruns Acides over Grey-Brown Podzolic soils.	Zonal.
Benson	Loamy, mixed, mesic	Lithic Eutrochrepts	Inceptisols	Brown Forest soils	Intrazonal.
Burdett	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Sols Bruns Acides over Gray-Brown Podzolic soils.	Zonal.
Canandaigua	Fine-silty, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Cazenovia	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Chenango	Loamy-skeletal, mixed, mesic.	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Collamer	Fine-silty, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Colonie	Mixed, mesic	Alfic Udipsamments	Entisols	Sols Bruns Acides	Zonal.
Conesus	Fine-loamy, mixed, mesic	Glossaquic Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Darien	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Dunkirk	Fine-silty, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils (intergrading toward Sols Bruns Acides).	Zonal.
Edwards	(1)	(1)	Histosols	Bog	Intrazonal.
Eel	Fine-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils	Azonal.
Elnora	Mixed, mesic	Aquic Udipsamments	Entisols	Sols Bruns Acides	Zonal.
Fonda	Fine, illitic, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Humic Gley soils	Intrazonal.
Fredon	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Gray-Brown Podzolic soils	Zonal.
Fremont	Fine-loamy, mixed, acid, mesic.	Aeric Haplaquepts	Inceptisols	Sols Bruns Acides	Zonal.
Galen	Coarse-loamy, mixed, mesic.	Psammentic Hapludalfs.	Alfisols	Gray-Brown Podzolic soils (intergrading toward Sols Bruns Acides).	Zonal.
Genesee	Fine-loamy, mixed, mesic	Fluventic Eutrochrepts	Inceptisols	Alluvial soils	Azonal.
Halsey	Coarse-loamy, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Hilton	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Holly	Fine-silty, mixed, nonacid, mesic.	Fluventic Haplaquepts	Inceptisols	Alluvial soils (intergrading toward Low-Humic Gley soils).	Intrazonal.
Honeoye	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Hornell	Fine, illitic, mesic	Aeric Haplaquepts	Inceptisols	Sols Bruns Acides	Zonal.
Ilion	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Kendaia	Fine-loamy, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Brown Forest soils (intergrading toward Gray-Brown Podzolic soils).	Intrazonal.
Lakemont	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Lamson	Coarse-loamy, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Lansing	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils (intergrading toward Sols Bruns Acides).	Zonal.
Lima	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Lyons	Fine-loamy, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.

See footnote at end of table.

TABLE 10.—*Soil series classified according to the current system of classification and the 1938 system with its later revisions*—Continued

Series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Madalin	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Manheim	Fine-loamy, mixed, mesic	Aquollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Brown Forest soils).	Zonal.
Manlius	Loamy-skeletal, mixed, mesic.	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Marilla	Fine-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Middlebury	Coarse-silty, mixed, mesic.	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils	Azonal.
Minoa	Coarse-loamy, mixed, mesic.	Aquic Eutrochrepts	Inceptisols	Brown Forest soils (intergrading toward Gray-Brown Podzolic soils).	Intrazonal.
Mohawk	Fine-loamy, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils (intergrading toward Brown Forest soils).	Zonal.
Niagara	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Nunda	Fine-loamy, mixed, mesic	Glossaquic Hapludalfs.	Alfisols	Sols Bruns Acides over Gray-Brown Podzolic soils.	Zonal.
Odessa	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Ontario	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils (intergrading toward Sols Bruns Acides).	Zonal.
Ovid	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Palmyra	Fine-loamy, over sandy or sandy-skeletal, mixed, mesic.	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Phelps	Fine-loamy, mixed, mesic	Glossaquic Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Remsen	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Rhinebeck	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Romulus	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Schoharie	Fine, mixed, mesic	Glossoboric Hapludalfs.	Alfisols	Gray-Brown Podzolic soils	Zonal.
Scio	Coarse-silty, mixed, mesic.	Aquic Dystrochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Sloan	Fine-loamy, mixed, noncalcareous, mesic.	Fluventic Haplaquolls	Mollisols	Humic Gley soils	Intrazonal.
Stafford	Mixed, nonacid, mesic	Typic Psammaquents	Entisols	Sols Bruns Acides	Zonal.
Warners	Fine-silty, mixed, calcareous, mesic (fine-carbonatic).	Typic Haplaquolls	Mollisols	Humic Gley soils	Intrazonal.
Wayland	Fine-silty, mixed, nonacid, mesic.	Fluventic Mollic Haplaquepts.	Inceptisols	Alluvial soils (intergrading toward Low-Humic Gley soils).	Intrazonal.

[1] Edwards soils have not been placed in a family and a subgroup.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates. Table 10 shows the five soil orders in Genesee County—Alfisols, Inceptisols, Entisols, Mollisols, and Histosols.

SUBORDER: Each order is divided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. The suborder is not shown in table 10.

GREAT GROUP: Soil orders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that have pans interfering with growth of roots or movement of water. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 10, because the name of the great group is the last word in the name of the subgroup.

SUBGROUP: Great groups are divided into subgroups,

one representing the central (typic) segment of the group and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group.

FAMILY: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

New soil series must be established, and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series at the State, regional, and national levels of responsibility for soil classification results in a judgment that the new series should be established. Most of the soil series described in this publication have been established earlier. Five of the soil series used in this survey had tentative status when the survey was sent to the printer. They are the Appleton, Elnora, Marilla, Minoa, and Stafford series.

Descriptions of the Soil Series

This subsection describes each soil series in the county and the profile of a soil representative of the series. The section "Descriptions of the Soils" also describes the soil series, but in language that is easier for the layman to understand. Also in that section is a description of each mapping unit, including the land types in the county. These mapping units are shown on the large soil map.

The color of each horizon is described in words, such as yellowish brown, but it can also be indicated by symbols for the hue, value, and chroma, such as 10YR 5/4. These symbols, called Munsell color notations (*12*), are used by soil scientists to evaluate the color of the soil precisely. For the profiles described, the names of the colors and the color symbols are for moist soils unless stated otherwise.

ALDEN SERIES

The Alden series consists of deep, medium-textured, very poorly drained soils that are neutral to calcareous. These soils have an A1 horizon high in organic-matter content, a strongly gleyed B horizon, and, at a depth of 20 to 40 inches, a C horizon of calcareous glacial till. Generally, the upper horizons are almost stone free. The Alden soils are in low, wet areas. Unless drained, they are saturated with water except for short periods late in summer. They are the very poorly drained member of several drainage sequences of soils that developed in glacial till containing lime. Alden soils are coarser in texture than the Fonda soils, and they have a finer textured solum than the Lamson soils. In contrast to Alden soils, muck soils lack mineral materials and are in basins that are more favorable for the accumulation of various kinds of undecomposed organic material. Alden soils are distributed throughout most of the county. Undrained areas are in brushy pasture or poor timber.

Typical profile of Alden mucky silt loam (in a brushy area 1.5 miles northwest of the village of Le Roy):

A1—0 to 5 inches, black (10YR 2/1) mucky silt loam; moderate, coarse, granular structure; very friable; many fine roots; neutral; abrupt, wavy boundary. Horizon is 3 to 10 inches thick.

B21g—5 to 16 inches, light-gray to gray (10YR 6/1) silt loam; few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; slightly firm; neutral; few fine roots in upper part; clear, wavy boundary. Horizon is 7 to 14 inches thick.

IIB22g—16 to 31 inches, dark-gray (10YR 4/1) loam (10 to 15 percent chert fragments); few, medium, distinct, mottles of yellowish brown (10YR 5/6); weak, coarse, subangular blocky structure; slightly firm; neutral to weakly calcareous; no roots; gradual lower boundary. Horizon is 7 to 20 inches thick.

IIC—31 to 40 inches +, grayish-brown (10YR 5/2) cherty loam; few to common, medium, distinct mottles of strong brown (7.5YR 5/6); weak, thick, platy structure; firm; calcareous.

The A horizon generally is silt loam, but in small areas it ranges to very fine sandy loam. In color the A horizon ranges from 10YR 3/1 to N 2/0. The clay content in the 10- to 40-inch zone is 18 to 35 percent. The content of coarse fragments ranges from 0 to 20 percent to a depth of 20 inches and from 0 to 25 percent below that depth. In the zone above a depth of 40 inches, the percentage of coarse fragments and sand is higher than in a soil typical for the series.

ALLIS SERIES

The Allis series is made up of acid, poorly drained soils that have a moderately fine textured and fine textured subsoil. These soils formed in glacial till consisting mainly of olive-gray shale. They are in the same drainage sequence as the moderately well drained and somewhat poorly drained Hornell soils. The Allis soils are finer textured and more poorly drained than the Fremont soils. They have a lower base status than the Ilion, Madalin, and Romulus soils. They lack the reddish hues of the Romulus soils. Allis soils lie in flat depressional areas and in drainageways on the Allegheny Plateau in southwestern Genesee County.

Typical profile of Allis silty clay loam (in a flat depressional area in an old pastured field, 1 mile east of Akron Reservoir):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay loam; common, fine, distinct, dark yellowish-brown (10YR 3/4) root mottles (variegated colors around old root channels); moderate, fine, granular structure; friable; many fine roots; strongly acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2g—8 to 13 inches, gray (10YR 5/1) light silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/4–5/6); weak, medium, subangular blocky structure; friable or slightly firm; few fine roots; strongly acid; clear, smooth boundary. Horizon is 0 to 7 inches thick.

B2g—13 to 26 inches, grayish-brown (2.5Y 5/2) and gray (N 5/0) silty clay loam to silty clay interiors; gray (5Y 5/1) ped surfaces; few shale fragments; many, medium and coarse, prominent mottles of yellowish brown (10YR 5/6–5/8); strong, coarse, prismatic structure that breaks to moderate, medium, blocky structure; firm when moist, sticky when wet; no roots; strongly acid; clear, smooth boundary. Horizon is 9 to 15 inches thick.

Cg—26 to 40 inches, gray (5Y 5/1) silty clay; common shale fragments; many, medium, prominent mottles of strong brown (7.5YR 5/8) and yellowish brown (10 YR 5/6), and some distinct mottles of olive brown (2.5Y 4/4); moderate, very coarse, prismatic structure that extends 6 to 10 inches into massive bedded clay shale; interiors of prisms have weak fine plates of disintegrating shale; firm when moist, sticky when wet; strongly acid; clear, wavy boundary. Horizon is 10 to 18 inches thick.

IIR—40 inches +, soft, continuous and coherent, olive-colored shale bedrock; strongly acid; bedrock can be penetrated with auger or spade with little difficulty.

The texture of the Ap horizon ranges from silt loam to silty clay loam. In the B horizon the texture ranges from silty clay loam to clay, and the percentage of clay, from 35 to 55 percent. Hues range from 10YR to 5Y. In the Ap, or the A1, horizon the value is 3 or 4 and the chroma is 2 or 1. The value in the A2 horizon is 5 or 6 and the chroma is 1 or 2. In the B and C horizons, the values and chromas are more variable and range from 3 to 5 and from 2 to 0, respectively. The solum is strongly acid or very strongly acid. In uneroded areas a chroma of 3 immediately below the Ap, or A1, horizon distinguishes the moderately well drained or somewhat poorly drained Fremont or Hornell soils. In the Allis soils, fragments of shale are few to common in the B horizon and are common to many in the C horizon. The depth to shale bedrock ranges from 2 to 5 feet, but in most places it is 40 inches or more.

Angola Series

The Angola series consists of somewhat poorly drained soils that are moderately deep over hard limestone or shale. Except for their moderate depth, the Angola soils are similar to the Ovid, Darien, and Appleton soils. They are less acid than the Manlius soils and, unlike those soils, have a textural B horizon. The Angola soils occur mainly in the southern part of the county. In most areas they are in pasture or mixed hardwoods.

Typical profile of Angola silt loam (in a nearly level pastured field, 0.5 mile northwest of Bethany Center):

Ap—0 to 7 inches, very dark grayish-brown (2.5Y 3/2) silt loam (5 percent shale fragments); moderate, medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 5 to 9 inches thick.

A2—7 to 12 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, very fine, subangular blocky structure; friable; common fine roots; medium acid; clear, wavy boundary. Horizon is 3 to 7 inches thick.

B21t—12 to 21 inches, brown (10YR 4/3) heavy silt loam interiors, and dark grayish-brown (2.5Y 4/2) ped surfaces (10 percent shale fragments); distinct interfingering surrounding some peds in upper part; many, medium, distinct mottles of light gray (10YR 6/1) and yellowish brown (10YR 5/6); some clay films in pores; moderate, medium, subangular blocky structure; slightly firm; few fine roots; slightly acid; clear, wavy boundary. Horizon is 7 to 12 inches thick.

B22t—21 to 31 inches, dark grayish-brown (2.5Y 4/2) shaly light silty clay loam; moderate, medium, subangular blocky structure; slightly firm to firm; numerous gray (5Y 5/1) clay films on ped faces and in pores; few roots in upper part; neutral; abrupt, smooth boundary. Horizon is 8 to 11 inches thick.

IIR—31 inches +, olive-brown (2.5Y 4/4) and dark grayish-brown (10YR 4/2), layered shale bedrock; hard, with very few fractures; weakly calcareous.

The texture of the Ap horizon is silt loam or loam. The B horizon is loam, silt loam, or light silty clay loam that has a clay content ranging from 18 to 35 percent for the control section. Coarse fragments make up 5 to 25 percent of the solum. The fragments are dominantly shale or limestone, depending on the kind of parent rock. Hues in the solum range from 5 YR to 5Y. In places the Ap horizon has a value of 3 or 4 and a chroma of 2. If material from the Ap horizon is rubbed when moist, it has a value of 3.5 to 4. The A2 horizon has values of 6 to 4 and a chroma of 2; the B horizon has values of 5 to 3, a chroma of 4 or 3 for the interior of peds, and a chroma of 2 for the exterior. Below the Ap horizon, to a depth of 30 inches, the chroma of the matrix is dominantly greater than 2. The depth to hard rock ranges from 20 to 40 inches.

Appleton Series

The Appleton series consists of somewhat poorly drained, medium-textured soils that formed in calcareous glacial till. The till is a mixture of limestone, sandstone, and shale. In most places it is reddish gray to reddish brown, but in some areas it is grayish brown. These soils are in the same drainage sequence as the well drained Ontario soils, the moderately well drained Hilton soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. Appleton soils also are wetter associates of the Lansing and Conesus soils. In contrast to the Appleton soils, which have a prominent A2 horizon and a well-expressed textural B horizon, the Kendaia soils have a weakly developed B horizon and their A2 horizon is thin or lacking. The Darien and Ovid soils, unlike the Appleton, formed in moderately fine textured material. Appleton soils are much lighter colored than the Manheim soils, and their B horizon lacks the fine blocky structure of those soils. The Appleton soils occur in all parts of the county except the southwestern.

Typical profile of Appleton silt loam (in a nearly level cultivated field, 2.5 miles southeast of the hamlet of Stone Church):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; neutral; many fine roots; abrupt, smooth boundary. Horizon is 6 to 12 inches thick.

A2—8 to 16 inches, pale-brown (7.5YR 6/3) loam; many, fine and medium, distinct mottles of grayish brown (2.5 Y 5/2) and yellowish brown (10YR 5/6); weak, medium, platy structure to weak, medium, subangular blocky structure; friable; slightly acid; few fine roots; clear, wavy boundary. Horizon is 5 to 10 inches thick.

B2t—16 to 30 inches, reddish-brown (5YR 4/3) fine loam interiors, and brown (7.5YR 5/2) ped faces; many, medium, distinct mottles of yellowish brown (10YR 5/6); common brown (7.5YR 5/2) clay films along ped faces; pockets or fingers of material from A2 horizon showing bleached sand grains occur on ped faces in the upper 2 to 4 inches; moderate, medium, subangular blocky structure; slightly firm; few fine roots in upper part; neutral; clear, wavy boundary. Horizon is 12 to 17 inches thick.

C—30 to 42 inches +, reddish-gray (5YR 5/2) fine gravelly loam; few, faint, brown (7.5YR 5/2) mottles; weak, medium to thick, platy structure; firm; calcareous.

In Genesee County the Ap horizon generally is silt loam, though in small areas it is loam or very fine sandy loam. The A horizon is 0 to 20 percent rounded pebbles or stones, and the B and C horizons are 10 to 25 percent coarse fragments. Locally, where silty material has been washed in from higher soils, the A horizon is stone free. Clay makes up 18

to 28 percent of the B2t horizon. Appleton soils are reddish in areas near the Hilton soils, and they are grayish in areas near the Conesus soils. The solum ranges from moderately acid to neutral in the A horizon and from slightly acid to mildly alkaline in the B horizon. The depth to carbonates ranges from 24 to 36 inches. The depth to bedrock generally ranges from 40 inches to 30 feet, but in local areas it is as much as 40 feet.

Arkport Series

The Arkport series consists of well-drained soils that formed in sandy deposits. These soils have a banded or diffuse textural B horizon in which the median particle size is near the boundary separating fine sand and very fine sand. They are in the same drainage sequence as the moderately well drained Galen soils, the somewhat poorly drained Minoa soils, and the poorly drained or very poorly drained Lamson soils. The Arkport soils are lower in silt and clay content than the Dunkirk soils, and they lack the blocky, more uniform textural B horizon of those soils. Arkport soils and Colonie soils formed in similar sandy deposits, but the Colonie do not have the textural bands of the Arkport. The Arkport soils are undulating to hilly or steep, and mainly convex. Some areas are along the sides of the main valleys, but the largest acreage is in the Tonawanda Creek basin west of Batavia and in the area of Oak Orchard Creek.

Typical profile of Arkport very fine sandy loam (in a cultivated field having a slope of 4 percent, one-half mile southwest of the hamlet of North Pembroke):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; weak, fine, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 5 to 11 inches thick.

A2—9 to 14 inches, yellowish-brown (10YR 5/4) very fine sandy loam; very weak, fine, granular structure; very friable; common fine roots; strongly acid; clear, wavy boundary. Horizon is 0 to 3 inches thick.

B1—14 to 20 inches, brown (10YR 5/3) very fine sandy loam; very weak, fine, subangular blocky structure; friable; few fine roots; moderately acid; clear, wavy boundary. Horizon is 4 to 8 inches thick.

B2t—20 to 42 inches, pale-brown (10YR 6/3) loamy very fine sand that is structureless and very friable; interspaced with bands of brown (7.5YR 4/4) very fine sandy loam; bands are ½ inch to 1½ inches thick, are spaced at intervals of 4 to 6 inches, and have a total thickness of 5 to 6 inches; they are generally thinner and more widely spaced with depth; very fine sandy loam has weak to moderate, fine, subangular blocky structure; it is slightly firm when moist and is sticky when wet; slightly acid or neutral; gradual, wavy boundary. Horizon is 17 to 27 inches thick.

C—42 to 60 inches +, grayish-brown (10YR 5/2) layers of loamy fine sand, very fine sand, and coarse silt; slightly firm in place; loose when disturbed; calcareous.

The parent material generally is stratified to some extent, and the textures of the strata are reflected as bands within the solum. Although the median size of particles is near the boundary that separates fine sand and very fine sand, very fine sand is normally dominant. The profile is low in content of medium sand and clay. In places where the coarsest texture above the banded B horizon is loamy fine sand having a relatively high content of very fine sand, the banded B horizon contains only enough silt and clay to result in bands of light fine sandy loam that occupy at least 10 percent of the horizon and have a combined thickness of at least 6 inches. The zones between the bands, and the substratum also, are fine sand or very fine sand. In places where the finest texture above the banded B horizon is very fine sandy loam that is high in content of fine sand, the banded B horizon includes bands of fine sandy loam or very fine sandy loam that occupy 40 to 50 percent of the horizon and have a total thickness of as much as 16 inches, providing the banded B horizon is not prominent and lacks blocky structure. Where the B horizon is stratified, layers of silt loam make up as much as 30 percent of the volume in some places. Colors vary little from those given in the typical profile. In the B horizon, some of the finer textured material ranges from 7.5YR 5/4 to 10YR 4/3. The reaction in the solum is moderately acid to mildly alkaline. In uneroded areas carbonates are at a depth of 40 to 60 inches. The depth to bedrock generally ranges from 15 to 100 feet or more. The depth is greatest in the steepest areas.

Benson Series

In the Benson series are medium-textured, well-drained to excessively drained soils that are shallow over limestone bedrock. They have a high base status, and their reaction is nearly neutral. The solum is mainly cherty limestone materials. These soils lack the textural B horizon of the Honeoye, Ontario, and Mohawk soils, all of which are deeper than the Benson soils. They are less acid than the Manlius soils, which formed in material consisting dominantly of shale. Benson soils occur in areas that lie in an east-west band across the central part of the county.

Typical profile of Benson cherty loam (in a nearly level hayfield, 2 miles northeast of Indian Falls):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) cherty loam; moderate, fine and medium, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

B2—9 to 16 inches, brown to dark yellowish-brown (10YR 4/3-4/4) cherty loam; very weak, medium, subangular blocky structure; friable; common fine roots; neutral; clear, smooth boundary. Horizon is 3 to 9 inches thick.

C—16 to 19 inches, brown (10YR 4/3) very cherty loam; structureless; very friable; few fine roots; mildly alkaline; abrupt, irregular boundary. Horizon is 1 to 5 inches thick.

IIR—19 inches +, grayish flinty limestone, fractured in upper part; material from above seeping down in fractures.

The texture of the A horizon is loam or silt loam. In the B horizon, the texture ranges from loam to light silty clay loam and the maximum clay content is about 30 percent. The color of the A horizon is very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2), and that of the B horizon ranges from reddish brown (5YR 4/3) to pale brown (10YR 6/3). Coarse fragments make up 5 to 40 percent of the solum, by volume. The solum is slightly acid to mildly alkaline. The depth to bedrock ranges from 10 to 20 inches.

Burdett Series

Soils of the Burdett series are somewhat poorly drained. They formed in a mantle of silt over sharply contrasting glacial till of moderately fine texture. The silt was either glacial or eolian in origin; the till was strongly influenced by gray, dark-gray, or olive-colored, clayey shale or by reworked lake sediments similar to disintegrated shale. The A and B1 horizons of Burdett soils formed in the silty mantle, whereas the textural B horizon formed in till. These soils are in the same drainage sequence as the moderately well drained and well drained Nunda soils. Their color B (B1) horizon distinguishes them from the Remsen, Darien, and Ovid soils. The subsoil of the Burdett soils is finer textured than that of the Kendaia, Appleton, and Manheim soils. Burdett soils are less acid than the Fremont and Hornell soils, both of which

lack a textural B horizon. The Burdett soils are gently sloping and nearly level and occur mainly in Bethany and Pavilion Townships.

Typical profile of Burdett silt loam (in a nearly level cultivated field, one-half mile south of Texaco Town):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate; fine, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

A2—9 to 18 inches, grayish-brown (10YR 5/2) silt loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles, and faint grayish-brown (2.5Y 5/2) mottles; very weak, fine, subangular blocky structure that breaks to medium granular structure; friable; common fine roots; slightly acid; clear, smooth boundary. Horizon is 6 to 12 inches thick.

B1—18 to 28 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct mottles of light olive brown (2.5Y 5/4–5/6); weak, fine, subangular blocky structure that tends toward platy structure; friable; few fine roots; neutral; clear, wavy boundary. Horizon is 8 to 13 inches thick.

IIB2t—28 to 40 inches, dark grayish-brown (2.5Y 4/2) to olive-gray (5Y 4/2) coarse silty clay loam; many, medium, distinct mottles of olive (5Y 5/4) and light olive brown (2.5Y 5/6); few gray (5Y 5/1) clay films on ped faces; moderate, medium blocks within weak, medium prisms; slightly firm; no roots; mildly alkaline; gradual, smooth boundary. Horizon is 9 to 15 inches thick.

IIC—40 to 52 inches +, gray (N 5/2) silty clay loam streaked with olive gray (5Y 5/2) and olive (5Y 4/3); common, medium, distinct mottles of light olive brown (2.5Y 5/6); moderate, medium, platy structure or massive (structureless); some unweathered shale present; firm; calcareous.

The A and B1 horizons are loam or silt loam. In the IIB2t horizon the clay content ranges from 28 to 35 percent. The color ranges from 10YR to 5Y in hue. In the color B horizon, a chroma of 2 is common; in the textural B horizon, a chroma of 3 or 2. In the lower part of the B horizon, the color is influenced by the color of the local shale. The silty mantle ranges from 18 to 40 inches in thickness. In places where the solum is more than slightly acid, the Burdett soils intergrade to the Hornell or the Fremont soils. The soils of these two series lack the Bt horizon that occurs in the Burdett soils. In areas where mottling decreases below a depth of 12 inches, the Burdett soils intergrade to the Nunda soils. Calcareous material is at a depth of 30 to 42 inches. The underlying bedrock is mainly various kinds of shale. The depth to bedrock generally ranges from 40 inches to 10 feet, but in places it is as much as 25 feet.

Canandaigua Series

The Canandaigua series consists of poorly drained and very poorly drained soils that formed in silty, calcareous lacustrine deposits. These soils are characterized by a very dark gray A1, or Ap, horizon and a mottled B horizon that is more blocky, though it may not be finer textured, than the A and C horizons. In some places clay films are evident in the lower part of the B horizon. Canandaigua soils are in the same drainage sequence as the somewhat poorly drained Niagara soils, the moderately well drained Collamer soils, and the well drained Dunkirk soils. The Canandaigua soils have a less sandy solum than the Lamson soils, and they are from coarser textured materials than the Lakemont and Madalin soils. In contrast to the Canandaigua soils, the Lyons soils formed in glacial till and lack a fragment-free solum and a varved silty substratum. Canandaigua soils are in the level or nearly level lower part of the lake plain and in isolated low pockets in adjoining till areas.

Typical profile of Canandaigua silt loam (in a nearly level hayfield, 1½ miles northeast of the village of Alabama):

Ap—0 to 9 inches, very dark gray (10YR 3/1) silt loam; moderate, fine and medium, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

B21g—9 to 10 inches, gray (10YR 5/1) silt loam; few to common, medium, distinct mottles of dark yellowish brown (10YR 4/4); weak, medium, subangular blocky structure; slightly firm; neutral; abrupt, wavy boundary. Horizon is ½ inch to 1½ inches thick.

B22g—10 to 23 inches, gray to grayish-brown (10YR 5/1–5/2) silt loam; many, medium, distinct mottles of dark yellowish brown (10YR 4/4); moderate, medium, subangular and angular blocky structure; slightly firm; neutral; clear, smooth boundary. Horizon is 12 to 15 inches thick.

B23g—23 to 29 inches, gray (10YR 5/1) coarse silt loam; common, fine, distinct mottles of brown (10YR 4/3) and yellowish brown (10YR 5/4); weak to moderate, medium, platy structure; slightly firm; mildly alkaline; clear, wavy boundary. Horizon is 3 to 8 inches thick.

B24g—29 to 39 inches, grayish-brown (10YR 5/2) heavy silt loam; many, medium, distinct mottles of dark yellowish brown and yellowish brown (10YR 4/4–5/4); a few, indistinct, gray (10YR 5/1) clay films in pores and on faces; moderate, thick, platy structure within weak, medium prisms, and some blocky structure along prism faces; slightly firm; mildly alkaline; clear, smooth boundary. Horizon is 9 to 12 inches thick.

C—39 to 45 inches +, grayish-brown (2.5Y 5/2) silt loam; some faint mottles; platy; slightly firm; calcareous.

The Ap horizon is dominantly silt loam, but in some areas it is fine sandy loam. In the B horizon the texture ranges from silt loam to silty clay loam. The clay content ranges from 18 to 35 percent. In places where the content of silt is high and of clay is low, the profile lacks distinct blocky structure and is firmer in the lower part of the B horizon than the typical profile. The B horizon is stratified in some places. Here, the finer textured strata range from silt loam to silty clay loam and the adjacent strata are fine sandy loam to loamy very fine sand. The percentage of sand coarser than very fine is less than 15 percent. The solum ranges from slightly acid to mildly alkaline, and carbonates are present at a 20- to 40-inch depth. The color ranges from 10YR to 5YR in hue. In poorly drained areas the A horizon is very dark gray to very dark brown (10YR 3/1 to 2/2) and is not mucky; the subsoil has a chroma of 2 or 1. In very poorly drained areas, the A horizon is black to very dark brown (10YR 2/1 to 2/2) and is mucky; the subsoil has a chroma of 1 or 0. The depth to bedrock ranges from 8 to 30 feet.

Cazenovia Series

The Cazenovia series consists of well drained or moderately well drained soils that formed in moderately fine textured, reddish, calcareous glacial till. In some places the till is dominantly a mixture of limestone and reddish calcareous shale. Here, the soils occur near outcrops of reddish shale. Elsewhere, the till is a mixture of limestone till and reddish lacustrine clay that has been reworked by glacial ice. In these places the soils occur along the edges of old glacial lakes, on and below the Onondaga escarpment. The Cazenovia soils are similar to, but are better drained than, the moderately well drained or somewhat poorly drained Ovid soils, the poorly drained Romulus soils, and the very poorly drained Alden soils. Cazenovia soils are finer textured than the Honeoye, Ontario, and Lansing soils, but they are not so fine textured as the Schoharie soils, which formed in lacustrine silty

clay. In texture they are similar to the Darien soils, but the Cazenovia formed in reddish materials, whereas the Darien formed in olive-gray materials. The blocky structure of the Cazenovia soils is made up of larger blocks than that of the Mohawk soils, which are dark brown or very dark brown and have a lower clay content than the Cazenovia soils. The Cazenovia soils occur in the north-central part of the county, north of the Onondaga escarpment.

Typical profile of Cazenovia silt loam (in a cultivated field having a slope of 5 percent, 3 miles northeast of the city of Batavia) :

Ap—0 to 10 inches, dark-brown (7.5YR 3/2) to very dark grayish-brown (10YR 3/2) silt loam (10 percent stone fragments) ; weak, fine and medium, granular structure; very friable; neutral; many fine roots; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2—10 to 12 inches, light grayish-brown (10YR 6/2) silt loam; common, fine, faint mottles of brown (7.5YR 5/4–4/4) ; weak, coarse, granular structure; friable; common fine roots; slightly acid; abrupt, irregular boundary that interfingers into the B horizon. The A2 horizon is 0 to 6 inches thick.

IIB21—12 to 19 inches, reddish-brown (5YR 4/3) silty clay loam (5 to 15 percent stone fragments) ; moderate, medium, subangular blocky structure; somewhat compacted in upper part; slightly firm when moist, slightly hard when dry; few roots; neutral; gradual, smooth boundary. Horizon is 5 to 10 inches thick.

IIB22t—19 to 31 inches, reddish-brown (5YR 4/3) silty clay loam (5 to 15 percent stone fragments) ; moderate, medium, angular blocky structure within moderate, medium, prismatic structure; reddish-brown (5YR 5/3) clay films on ped surfaces; slightly firm; mildly alkaline; gradual, smooth boundary. Horizon is 10 to 14 inches thick.

IIC—31 to 37 inches +, reddish-brown (5YR 5/3–4/3) clay loam; moderate, medium, angular blocks and some coarse prism faces extending into the upper part; firm; some limestone pebbles and grit present; calcareous.

In this county the A horizon is silt loam or silty clay loam. The clay content in the IIB22t horizon ranges from 28 to 35 percent. Coarse fragments make up 5 to 20 percent of any given horizon. Colors in the solum are dominantly 7.5YR to 2.5YR. In small areas the A2 horizon contains common distinct mottles, though the B horizon is unmottled. The pH is 6.0 to 7.2 in the A horizon and is 6.5 to 7.5 in the B horizon. Carbonates are at a depth ranging from 24 to 40 inches. The depth to bedrock ranges from 3½ to 25 feet or more.

Chenango Series

The Chenango series consists of well-drained soils that formed in gravelly material, dominantly dark-grayish or black shale. These soils have a well-expressed color B horizon. The coarse fragments of shale are brittle and are not so hard as the fragments of sandstone or limestone in typical glacial outwash. Chenango soils lack the B horizon of clay accumulation that occurs in Palmyra soils, and they are more acid than those soils. The Manlius soils, in contrast to the Chenango, are moderately deep over shale bedrock and are extremely shaly in the lower solum. The Chenango soils occupy isolated areas in the southwestern part of Genesee County.

Typical profile of Chenango shaly silt loam (in a nearly level cultivated field, 2½ miles south-southeast of the village of Darien Center) :

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) shaly silt loam; weak, medium, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

B21—9 to 14 inches, yellowish-brown (10YR 5/6) shaly silt loam; very weak, fine, granular structure; friable; common fine roots; strongly acid; clear, smooth boundary. Horizon is 4 to 6 inches thick.

B22—14 to 21 inches, yellowish-brown (10YR 5/4) shaly silt loam; very weak, medium, subangular blocky structure; friable to slightly firm; few fine roots; strongly acid; clear, wavy boundary. Horizon is 4 to 10 inches thick.

B23—21 to 33 inches, dark yellowish-brown (10YR 4/4) very shaly silt loam; very weak, medium, subangular blocky structure; friable to slightly firm; few fine roots; strongly acid; clear, wavy boundary. Horizon is 9 to 15 inches thick.

C—33 to 45 inches +, brown (10YR 4/3) very shaly loam; contains stratified shaly gravel and sand; loose; moderately acid; material is about 60 percent shale fragments.

The texture of the Ap horizon is mainly shaly silt loam, but in small areas it is gravelly loam. The coarse fragments are mostly flat pieces of shale, which are rounded along the edges, or rounded pebbles. Below the Ap horizon, the solum generally is shaly loam or shaly silt loam. The solum ranges from 20 to 36 inches in thickness, and it is strongly acid or moderately acid. Locally, there are layers having a hue of 7.5YR. In most places the C horizon is moderately acid or slightly acid, but limestone gravel may be present at a depth of 6 feet or more. Lenses of gravel-free sand occur erratically. The depth to acid, dark-colored shale ranges from 4 to 40 feet.

Collamer Series

The Collamer series consists of moderately well drained soils that formed in calcareous lacustrine deposits of silt and very fine sand. These soils are medium textured. They have a textural B horizon that is moderately well expressed and contains mottles. Although a thin color B horizon may occur in unplowed areas, this horizon generally is destroyed by plowing. These soils are in the same drainage sequence as the well-drained Dunkirk soils, the somewhat poorly drained Niagara soils, and the poorly drained or very poorly drained Canandaigua soils. Collamer soils are finer textured than the Galen soils, but they are not so fine textured as the Rhinebeck and Schoharie soils. The clay accumulation in the B horizon of Collamer soils is lacking in that of the Scio soils. The Collamer soils occupy slightly convex areas, mainly in the lower basins of Tonawanda and Oak Orchard Creeks. A smaller acreage is in areas scattered in others parts of the county, except at the higher elevations in the southern half.

Typical profile of Collamer silt loam (in a nearly cultivated field having a slope of 4 percent, 1½ miles north of the village of Corfu) :

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

A21—9 to 14 inches, brown (7.5YR 5/4) silt loam; few, fine, faint mottles of strong brown (7.5YR 5/6) ; moderate, thin, platy structure; friable; few fine roots; moderately acid; clear, smooth boundary. Horizon is 4 to 6 inches thick.

A22—14 to 14½ inches, light brownish-gray to grayish-brown (10YR 6/2–5/2) silt loam; few, medium, faint mottles of yellowish brown (10YR 5/4) ; structureless; friable; moderately acid; abrupt, irregular, discontinuous boundary. Horizon is ½ to 3 inches thick, but fingers ½ to 1 inch thick extend 4 to 10 inches into B horizon.

B1—14½ to 22 inches, brown (7.5YR 4/4) silt loam; a few, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocks within weak, coarse prisms; slightly firm; pH 6.3; clear, smooth boundary. Horizon is 3 to 10 inches thick.

B2t—22 to 33 inches, brown (7.5YR 4/4) to reddish-brown (5YR 4/4) heavy silt loam; common, fine, distinct mottles of strong brown (7.5YR 5/6) and pinkish gray (7.5YR 6/2); common reddish-brown (5YR 4/3) and reddish-gray (5YR 5/2) clay films in pores and on ped faces; moderate, medium, subangular blocks within weak, very coarse prisms; slightly firm when moist, slightly sticky when wet; neutral; clear, smooth boundary. Horizon is 12 to 14 inches thick.

C—33 to 40 inches +, brown (7.5YR 5/4) silt loam; common, medium, faint mottles of yellowish brown; moderate, medium, platy structure; firm; calcareous.

In this county the A horizon was mapped only as silt loam. The parent material is generally stratified, and the strata may appear as bands within the solum, but the finer textured strata have moderate blocky structure. The texture can range from very fine sandy loam to light silty clay loam in the same profile. The percentage of sand coarser than very fine is less than 15 percent. In some places the B horizon is as much as 35 percent clay. Hues range from 5YR to 10YR. Values and chromas vary little from those given in the typical profile. Generally, the A2 and B horizons are faintly or distinctly mottled. In the B2t horizon, however, the low-chroma mottles are lacking in some places. The Ap horizon has a pH of 5.5 to 6.5. Carbonates are at a depth ranging from 2 to 4 feet. The depth to bedrock is 5 to 40 feet.

Colonie Series

In the Colonie series are well-drained to excessively drained soils that formed in sandy lacustrine or eolian deposits. The sand is mostly fine, but it is nearly very fine. The deposits contain little medium sand or silt and very little clay. Colonie soils are in the same drainage sequence as the moderately well drained Elnora soils and the somewhat poorly drained Stafford soils. They are closer textured than the Arkport soils and lack the sticky, more clayey bands of those soils. The Colonie soils lack the textural B horizon of the Dunkirk soils, which formed in silty deposits. Colonie soils occur in undulating to rolling, mainly convex areas; they are most extensive in the Oak Orchard Creek and lower Tonawanda Creek basins.

Typical profile of Colonie loamy fine sand, 2 to 6 percent slopes (in an abandoned hayfield having a slope of 3 percent, 2½ miles northwest of the hamlet of East Oakfield):

Ap—0 to 8 inches, dark grayish-brown to dark-brown (10YR 4/2 to 4/3) loamy fine sand; weak, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary. Horizon is 4 to 10 inches thick.

B21—8 to 16 inches, yellowish-brown (10YR 5/6) loamy fine sand; very weak, very fine, granular structure; very friable; strongly acid; gradual, wavy boundary. Horizon is 7 to 9 inches thick.

B22—16 to 30 inches, yellowish-brown (10YR 5/4) loamy fine sand; very weak, very fine, granular structure; very friable; strongly acid; gradual, wavy boundary. Horizon is 11 to 18 inches thick.

B23—30 to 50 inches, light yellowish-brown (10YR 6/4) loamy fine sand to fine sand; brown (7.5YR 4/4) ½-inch bands or streaks of fine sandy loam about 6 to 10 inches apart; bands are slightly firm, and soil between them is single grain (structureless) and loose to very friable; moderately acid; diffuse boundary. Horizon is 17 to 25 inches thick.

B3—50 to 75 inches, pale-brown (10YR 6/3) fine sand that is single grain (structureless) and very friable; also, bands of brown (10YR 4/3) fine sandy loam, ¼ inch thick and 10 to 15 inches apart, that are slightly firm; slightly acid, loose when dry; diffuse boundary. Horizon is 20 to 30 inches thick.

C—75 inches +, grayish-brown to pale-brown (10YR 5/2 to 6/3) mostly fine sand, with thin strata of either very fine sand or medium sand; loose; slightly acid or neutral.

In Genesee County the A horizon was mapped only as loamy fine sand. The median particle size is chiefly fine sand, but it is near the boundary of very fine sand, and in most places very fine sand is a major component. The bands in the B horizon are more numerous or are thicker in places where the sands are finer. In areas where the bands have a combined thickness of about 6 inches in the 20- to 50-inch section, the Colonie soils intergrade to the Arkport soils. The bands ordinarily are missing where the sands are coarser. Generally, the solum is strongly acid to slightly acid and carbonates are at a depth of more than 60 inches. Mottling at a depth of 20 inches or less distinguishes the moderately well drained Elnora soils. The depth to bedrock ranges from 10 to 60 feet.

Conesus Series

The Conesus series consists of moderately well drained soils that formed in medium-textured, calcareous glacial till. The till is mainly limestone and shale but includes some sandstone. These soils have a prominent A2 horizon and a degrading textural B horizon that contains illuvial clay. They are in the same drainage sequence as the well-drained Lansing soils, the somewhat poorly drained Appleton soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. Conesus soils are similar to the Hilton soils in their A2 and textural B horizons, but they are grayish brown instead of reddish brown. They have a thicker solum and a more prominent A2 horizon than the Lima and Mohawk soils. They are coarser textured than the Darien soils. The Conesus soils occur mainly in the southeastern part of the county.

Typical profile of Conesus silt loam (in a cultivated field having a slope of 5 percent, 3 miles southwest of Texaco Town):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine and medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

A2—9 to 16 inches, brown (10YR 5/3) loam; weak, fine and medium, platy structure; friable; common fine roots; medium acid; abrupt, wavy boundary. Horizon is 3 to 10 inches thick.

B21—16 to 25 inches, brown (10YR 4/3) heavy silt loam; common, medium, distinct mottles of strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2); fingers of material from the A2 horizon surrounding some peds; moderate, medium, subangular blocky structure; friable to slightly firm; few fine roots; medium acid; clear, wavy boundary. Horizon is 6 to 12 inches thick.

B22t—25 to 36 inches, brown to dark-brown (10YR 4/3–3/3) heavy silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2); grayish-brown (2.5Y 5/2) clay films on ped faces and in pores; moderate, medium, subangular blocky structure; slightly firm; slightly acid; gradual, smooth boundary. Horizon is 9 to 14 inches thick.

C—36 to 45 inches +, grayish-brown (2.5Y 5/2) gritty silt loam; few, fine, faint mottles of olive brown (2.5Y 4/4); very weak, thick, platy structure; firm; calcareous.

In Genesee County the Ap horizon is only silt loam. The content of clay in the B22t horizon ranges from 18 to 28 percent. The thickness of the A2 horizon varies widely within the same field, but in most places 3 to 10 inches of this horizon remain after normal plowing. The solum is moderately acid or

slightly acid in the A horizon and is slightly acid to mildly alkaline in the B horizon. Carbonates are at a depth ranging from 30 to 42 inches. Stones and coarse fragments of shale make up less than 5 to about 15 percent of the A and B horizons. From 10 to 25 percent of the C horizon is coarse fragments. Hues are dominantly 10YR or yellower. In the B22t horizon the low-chroma mottles are lacking in some places. The depth to bedrock generally ranges from 3½ to 20 feet, but in small areas it is greater.

Darien Series

The Darien series consists of somewhat poorly drained and moderately well drained soils that formed in moderately dark colored, calcareous glacial till. The till is chiefly from soft, gray and dark-gray shale mixed with black, brittle shale. In some places it also contains reworked lake deposits of similar color and texture. The Darien soils have a textural B horizon in which the structure is blocky and the ped surfaces are coated with clay films. They are in the same drainage sequence as the poorly drained Ilion soils and the very poorly drained Alden soils. Above their textural B horizon, the Darien soils lack the mantle of coarse silt that characterizes the Burdette soils. They are finer textured than the Appleton and Kendaia soils, but they are not so fine textured as the Remsen soils. Darien soils are lighter colored than the Manheim soils, and their solum is less reddish than that of the Ovid soils. They are less acid than the Fremont and Hornell soils, and, unlike those soils, they have a textural B horizon. The Darien soils are less uniform in particle size distribution than the Niagara soils, which do not contain coarse fragments. Darien soils occur in the southwestern part of the county.

Typical profile of Darien silt loam (in a hayfield having a slope of 4 percent, 2½ miles southwest of the village of Darien Center):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

A2—9 to 11 inches, grayish-brown (2.5Y 5/2) heavy silt loam; common, medium, distinct mottles of light olive brown (2.5Y 5/6); weak, fine, subangular blocky structure; friable; common fine roots; slightly acid; clear, wavy boundary. Horizon is 1 to 4 inches thick.

B21t—11 to 19 inches, olive-brown (2.5Y 4/4) clay loam (30 percent clay); common fine shale fragments; many, medium, distinct mottles of dark yellowish brown (10YR 4/4) and light olive brown (2.5Y 5/6); discontinuous grayish-brown (2.5Y 5/2) clay films on ped surfaces; moderate, medium, prismatic structure; slightly firm; few fine roots; neutral; gradual, wavy boundary. Horizon is 6 to 11 inches thick.

B22t—19 to 32 inches, dark grayish-brown (2.5Y 4/2) silty clay loam (35 percent clay); common fine and medium shale fragments; common, medium, distinct mottles of yellowish brown (10YR 5/4) and olive (5Y 5/6); gray (5Y 5/1) clay film on ped faces; moderate, medium, subangular blocky structure within very weak, coarse, prismatic structure; firm; no roots; mildly alkaline; clear, wavy boundary. Horizon is 10 to 16 inches thick.

C—32 to 40 inches +, olive-gray (5Y 4/2) shaly silty clay loam; common, medium, distinct mottles of light olive brown (2.5Y 4/4) or gray (N 5/0) cleavage planes along shale fragments; weak, thick, platy structure to massive (structureless); firm; calcareous.

The A horizon typically is silt loam, but in small areas it ranges to light silty clay loam. The B horizon is mainly silty clay loam and has a clay content ranging from 28 to 35 percent. Hues range from 10YR to 5Y. Shale fragments are few to many and increase in number with depth. The average depth to carbonates is 30 inches, but the depth ranges from 25 to 40 inches. In places where the solum has a pH of 5.5 to 6.0, the Darien soils intergrade to the Fremont soils. The depth to bedrock is 40 inches to many feet. Bedrock is mainly black to gray shale of variable hardness.

Dunkirk Series

The Dunkirk series consists of well-drained soils that formed in silty, calcareous lacustrine deposits. Commonly, these deposits are stratified with layers of very fine sand. Dunkirk soils have a distinct A2 horizon and a textural B horizon that is moderately well expressed. They are in the same drainage sequence as the moderately well drained Collamer soils, the somewhat poorly drained Niagara soils, and the poorly drained and very poorly drained Canandaigua soils. The Dunkirk soils lack the thick color B horizon and the shaly subsoil of the Nunda soils. They formed in finer textured materials than the Arkport and Colonie soils. They are not so fine textured as the Schoharie and Rhinebeck soils, and they are better drained. The Dunkirk soils are undulating to hilly or steep. They occur mainly in the Tonawanda Creek basin west of Batavia. In addition, small areas are along the sides of other main valleys.

Typical profile of Dunkirk silt loam (in a cultivated field having a slope of 5 percent, one-half mile southwest of the hamlet of Indian Falls):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2—9 to 14 inches, pale-brown (10YR 6/3) coarse silt loam; weak, thin, platy structure; friable; common fine roots; moderately acid; clear, wavy boundary. Horizon is 1 to 9 inches thick.

B21—14 to 21 inches, reddish-brown (5YR 4/3) heavy silt loam; distinct interfingering of material from A2 horizon surrounding some peds; moderate, fine and medium, subangular blocky structure; slightly firm; few fine roots; slightly acid; clear, smooth boundary. Horizon is 5 to 10 inches thick.

B22t—21 to 32 inches, reddish-brown (5YR 4/3) light silty clay loam; moderate, medium, subangular blocky structure and some angular blocky structure; slightly firm; few fine roots along ped surfaces; some reddish-gray (5YR 5/2) clay films along ped surfaces; neutral; gradual, wavy boundary. Horizon is 3 to 14 inches thick.

C1—32 to 42 inches, brown (7.5YR 4/4) silt loam; weak, thick, platy structure; firm; calcareous; abrupt, wavy boundary. Horizon is 7 to 12 inches thick.

IIC2—42 to 50 inches +, brown (10YR 5/3) loamy very fine sand; some thin silty varves; calcareous.

In Genesee County the Ap horizon is only silt loam. In undisturbed areas there may be a thin color B horizon near the surface, but this horizon is destroyed by plowing to a 10-inch depth. In some places the horizons below the A horizon are stratified with layers that range from very fine sandy loam to light silty clay loam. Less than 15 percent of the sand is coarser than very fine in the argillic horizon. The clay content in the B horizon ranges from 18 to 35 percent. Colors range from 5YR to 10YR in hue. The values and chromas do not vary more than one unit from those in the typical profile. The A2 horizon may be faintly mottled if the B horizon is unmottled. The pH in the Ap horizon ranges from 5.5 to 6.5. Carbonates occur at a depth ranging from 2 to 4 feet. The depth to bedrock ranges from 5 to 50 feet or more; it is greatest in the steeper areas.

Edwards Series

In the Edwards series are very poorly drained organic soils that formed in the decayed remains of woody plants or of both woody and fibrous plants. These soils are underlain, at a depth of 1 to 3½ feet, by marl that varies in purity. They commonly occur in ponded areas. Where uncleared, they are in mixed stands of deciduous and coniferous trees, including soft maple, elm, and white-cedar. The Edwards soils are deeper to marl than the Warners soils, which generally consist of less than 12 inches of mineral or mucky material over marl. Other organic soils are either moderately deep over mineral material, or they are deeper than 3½ feet. Edwards soils occupy low areas that are scattered across the northern part of the county.

Typical profile of Edwards muck (in a low swampy area, 2 miles west of the village of Bergen):

0 to 10 inches, black (10YR 2/1), well-decomposed muck; moderate, fine, granular structure; very friable; mildly alkaline; gradual, wavy boundary. Layer is 6 to 13 inches thick.

10 to 24 inches, very dark brown (10YR 2/2) muck; moderate, fine, granular structure; very friable; mildly alkaline; clear, wavy boundary. Layer is 4 to 30 inches thick.

24 to 40 inches +, white (10YR 8/1) marl that contains numerous small shell fragments; moderate, granular structure; friable; strongly calcareous.

The second layer may be calcareous in the lower part. In undrained areas the depth to marl ranges from 12 to 42 inches. Bedrock is at a depth ranging from 40 inches to 50 feet. In some places there are mineral layers between the marl and bedrock.

Eel Series

The Eel series consists of somewhat poorly drained and moderately well drained soils that formed in medium-textured recent alluvium washed from calcareous glacial drift or from soils formed in such material. The Eel soils generally are neutral in the surface horizon and are calcareous at various depths. They are in the same drainage sequence as the well-drained Genesee soils, the poorly drained Wayland soils, and very poorly drained Sloan soils. The Eel soils lack the coarse fragments that occur in the Phelps soils. In contrast to Eel soils, the Middlebury soils are acid, and the Collamer and Galen soils have a textural B horizon. The Eel soils are mainly along the larger streams in the county.

Typical profile of Eel silt loam (in a level cultivated field, 1 mile northeast of the village of Alexander):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; many fine roots and worm casts; neutral; clear, smooth boundary. Horizon is 7 to 10 inches thick.

C1—10 to 24 inches, dark grayish-brown (10YR 4/2) silt loam; a few fine, faint mottles of dark brown (10YR 3/3) and grayish brown (10YR 5/2); very weak, very coarse, subangular blocky structure; friable; numerous worm channels; neutral; gradual, smooth boundary. Horizon is 13 to 16 inches thick.

C2—24 to 40 inches, dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) silt loam; few, fine, faint mottles of brown (10YR 4/2); very weak, thick, platy structure; friable; weakly calcareous; a few erratic sandy lenses present.

Lenses of material ranging from fine sandy loam to silty clay loam occur in some profiles. In places where sand particles coarser than very fine are present, they aggregate more than 15 percent of the control section. The A horizon has a value of 4 or 3 and a chroma mainly of 2. The hue is mostly 10YR but ranges from 7.5YR to 2.5Y, depending on the nature of the soils from which the alluvium washed. In some places the profile is 10YR 3/2 or 10YR 4/2 throughout. In most places the Eel soils are neutral in the A horizon and are weakly calcareous at a depth of 2 to 4 feet, but they range from pH 6.0 in the A horizon and pH 6.5 in the lower profile to mildly alkaline throughout. A lack of mottles distinguishes the well-drained Genesee soils; distinct mottles above a depth of 14 inches identify the Wayland soils. The depth to bedrock ranges from 4 to 40 feet.

Elnora Series

In the Elnora series are moderately well drained soils that formed in sandy lacustrine or eolian deposits. The sand is mostly fine but is near the limit of very fine, and there is very little clay. The most conspicuous feature of the Elnora soils is a color B horizon that shows distinct mottles at a depth of 18 to 20 inches. These soils are in the same drainage sequence as the well-drained to excessively drained Colonie soils and the somewhat poorly drained Stafford soils. Elnora soils are coarser textured than the Galen soils, and they lack the sticky clayey bands of those soils. They formed in less silty material than the Collamer and Scio soils. The Elnora soils occupy gently sloping areas, mostly in the basins of Oak Orchard Creek and lower Tonawanda and Black Creeks.

Typical profile of Elnora loamy fine sand (in a cultivated field having a slope of 3 percent, 2 miles northeast of the village of Akron):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, fine and medium, granular structure; very friable; abundant fine roots; moderately acid; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

B2—9 to 18 inches, yellowish-brown (10YR 5/5–5/6) loamy fine sand or loamy very fine sand; weak, fine and medium, granular structure; very friable; few fine roots; strongly acid; clear, wavy boundary. Horizon is 7 to 11 inches thick.

B3—18 to 35 inches brown (10YR 5/3) very fine sand; many, medium and fine, distinct mottles of brown and strong brown (7.5YR 4/4 and 5/6), and few, fine, faint mottles of light brownish gray (10YR 6/2); weak, thick, platy structure; slightly firm or friable; few fine roots in upper part; moderately acid; gradual, wavy boundary. Horizon is 13 to 21 inches thick.

C1—35 to 50 inches, brown (10YR 5/3) fine sand or very fine sand; many, coarse, faint mottles of dark brown (10YR 4/3); single grain (structureless); friable; no roots; moderately acid; gradual, smooth boundary. Horizon is 12 to 18 inches thick.

C2—50 to 65 inches, dark grayish-brown (10YR 4/2) very fine sand; single grain; very friable; slightly acid; clear, wavy boundary. Horizon is 12 to 17 inches thick.

IIC3—65 to 75 inches +, grayish-brown (10YR 5/2) very fine sandy loam; massive; firm; neutral.

The texture is dominantly loamy fine sand throughout the solum. In places, however, it is loamy very fine sand. The median particle size is fine sand, but is is near the limit of very fine sand, which normally is a major component. The content of medium sand and of silt is very low. At the finest extreme of the textural range, very fine sand is dominant or is equal in content to that of fine sand and there are bands in the B horizon. Where such bands are significantly finer textured than the adjacent material and aggregate more than 6 inches of the control section, the Elnora soils intergrade to the Galen soils. At the coarsest extreme of the textural range, fine sand is dominant and the bands are missing. The values

and chromas vary little from those given in the typical profile. The solum is strongly acid to slightly acid in most places, but the C horizon is neutral or calcareous at a depth of 55 inches. The depth to bedrock ranges from 4 to 40 feet or more.

Fonda Series

In the Fonda series are deep, very poorly drained soils that have a fine-textured B horizon. These soils formed in depressional areas that are ponded for long periods. They have a black A1 horizon and an A2 horizon that is highly gleyed. Fonda soils are in the same drainage sequence as the poorly drained Madalin soils and the somewhat poorly drained Remsen soils. They are finer textured than the Alden soils. The Fonda soils occur mainly in the southern part of the county, generally in brushy or marshy areas.

Typical profile of Fonda mucky silt loam (in a depressional spot in an idle field covered with scattered water-tolerant brush, 1½ miles northwest of the hamlet of Bethany Center):

A1—0 to 5 inches, black (10YR 2/1) mucky silt loam, high in organic-matter content; moderate, fine, granular structure; very friable; many medium and fine roots; neutral; clear, smooth boundary. Horizon is 2 to 9 inches thick.

A2g—5 to 13 inches, light-gray (N 6/0) silt loam; few, medium, distinct mottles of yellowish brown (10YR 5/4); very weak, fine, subangular blocky structure; friable; few fine roots in upper part; neutral; clear, wavy boundary. Horizon is 5 to 11 inches thick.

IIB21g—13 to 19 inches, dark-gray to dark grayish-brown (10YR 4/1 to 2.5Y 4/2) silty clay; common, medium, distinct mottles of light olive brown (2.5Y 5/6); moderate, medium, subangular blocky structure; slightly firm when moist, sticky when wet; no roots; mildly alkaline; clear, smooth boundary. Horizon is 4 to 8 inches thick.

IIB22g—19 to 30 inches, very dark grayish-brown (2.5Y 3/2) silty clay; common, medium, distinct mottles of yellowish brown (10YR 5/6) and gray (N 5/0); moderate, coarse, subangular blocky structure; firm when moist, very sticky when wet; mildly alkaline; clear, wavy boundary. Horizon is 8 to 14 inches thick.

IICg—30 to 40 inches +, dark grayish-brown (2.5Y 4/2) to olive (5Y 4/3) shaly silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6) and gray (N 5/0); massive (structureless) to moderate, medium, platy structure; firm when moist, sticky when wet; calcareous.

In Genesee County the texture of the A horizon is only silt loam. The B and C horizons range from silty clay loam to silty clay and have a clay content ranging from 35 to 55 percent. These soils typically have gray hues, but in some places they have reddish (5YR) hues. Soils in which the dominant hues are 7.5YR or redder are identified as the Lakemont soils. The reaction is slightly acid to mildly alkaline, and carbonates occur at a depth of 20 to 40 inches. The depth to shale bedrock is 4 to 20 feet.

Fredon Series

The Fredon series consists of somewhat poorly drained soils that formed in calcareous glacial outwash derived from limestone, sandstone, and shale. These soils have a very dark A1, or Ap, horizon; a lighter colored A2 horizon that is distinctly mottled; a weak argillic B horizon that is slightly finer textured than the A horizon; and a C horizon that is a mixture of unweathered sand and gravel. They are in the same drainage sequence as the well drained Palmyra soils, the moderately well drained Phelps soils, and the poorly drained or very poorly drained Halsey soils. The Fredon soils contain few to many rounded pebbles, which are lacking in the Minoa and Niagara soils. Unlike the Fredon soils, the Kendaia and Appleton soils contain coarse fragments that normally are angular, and they lack the underlying strata of sand and gravel. The Fredon soils generally lie in low, nearly flat areas on outwash terraces along the main drainageways in the county.

Typical profile of Fredon gravelly loam (in a nearly level cultivated field, 1 mile south of the city of Batavia):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) gravelly loam; weak, fine, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

IIA2g—9 to 15 inches, grayish-brown (10YR 5/2) gravelly fine sandy loam; many, medium, distinct mottles of pale brown (10YR 6/3) and yellowish brown (10YR 5/6); moderate, medium, platy structure; friable; few fine roots; slightly acid; abrupt, irregular boundary. Horizon is 5 to 10 inches thick.

IIIB1—15 to 25 inches, brown (10YR 4/3) gravelly loam; common, medium, distinct mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; slightly firm; no roots; neutral; clear, wavy boundary. Horizon 7 to 13 inches thick.

IIIB2t—25 to 36 inches, brown (10YR 4/3) gravelly loam interiors; brown (7.5YR 4/2) clay films; common, fine, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); weak to moderate, subangular blocky structure; friable when moist, slightly sticky when wet; neutral; abrupt, wavy boundary. Horizon is 9 to 14 inches thick.

IVC—36 to 45 inches +, grayish-brown (10YR 5/2), poorly stratified, fine and medium sand and gravel; single grain (structureless); very friable; calcareous.

The Ap horizon ranges from gravel-free fine sandy loam to gravelly silt loam. In most places, however, it is very fine sandy loam or loam and has a gravelly content of 10 to 20 percent. In some places the upper part of the solum includes horizons that are free of gravel. These horizons are as much as 20 inches thick and consist of very fine sandy loam that appears to be overwash. In places where shale has influenced the soil materials, the profile generally is darker than the typical one and has lower values and chromas. The reaction ranges from pH 6.5 to 7.0 in the A horizon and from 6.5 to 7.5 in the B horizon. Clay films may be lacking in the IIIB2t horizon. The depth to calcareous material is 24 to 42 inches. The depth to bedrock is 10 to 40 feet.

Fremont Series

In the Fremont series are somewhat poorly drained soils that formed in acid glacial till consisting mainly of olive-gray silty shale, together with a small amount of dark brittle shale or sandstone fragments. Characteristically, these soils have a high silt content and are silt loam or light silty clay loam throughout the solum. Although they contain prominent mottles that are similar to the ones in the Hornell soils, they are not so fine textured as those soils. The Fremont soils lack the distinct fragipan and the high shale content of the Marilla soils. In addition, they lack the clay flow and the high base status in the B horizon of the Darien and Burdett soils. Fremont soils are not so poorly drained as the Allis soils. The Fremont soils occur in nearly level or sloping areas at the higher elevations on the plateau in southwestern Genesee County.

Typical profile of Fremont silt loam (in a field having a slope of 4 percent and planted to young trees, 2 miles southwest of the village of Darien City):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam, light olive brown (2.5Y 5/4) when crushed; weak, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

B21—7 to 12 inches, olive-brown (2.5Y 4/4) silt loam; common, medium, distinct mottles of light olive brown (2.5Y 5/6) and gray (5Y 5/1); weak, medium, subangular blocky structure; friable; strongly acid; clear, smooth boundary. Horizon is 3 to 8 inches thick.

B22—12 to 18 inches, light olive-brown (2.5Y 5/4) light silty clay loam interiors; pale-olive (5Y 6/3) ped exteriors; many, fine, distinct mottles of yellowish brown (10YR 5/6) and many, prominent mottles of strong brown (7.5YR 5/8); weak to moderate, medium, subangular blocky structure; slightly firm; strongly acid; clear, smooth boundary. Horizon is 5 to 8 inches thick.

B23—18 to 28 inches, olive (5Y 5/3) light silty clay loam; many, medium, prominent mottles of yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6); light olive-gray (5Y 6/2) silt coatings on ped faces; moderate, medium, subangular blocks tending to platiness in lower part, within weak coarse prisms; slightly firm; strongly acid; clear, smooth boundary. Horizon is 6 to 13 inches thick.

C—23 to 36 inches +, gray (5Y 5/1–6/1) shaly light silty clay loam streaked with many, fine, distinct mottles of olive (5Y 4/3) and dark yellowish brown (10YR 4/4); weak, medium, platy structure (imparted by disintegrated shale); firm; strongly acid.

The Ap horizon generally is silt loam. In the B horizon the texture ranges from heavy silt loam to silty clay loam. The clay content ranges from 18 to 35 percent. Generally, the percentage of sand particles coarser than very fine is more than 15 percent. The depth to bedrock is 3½ to 10 feet.

Galen Series

The Galen series consists of moderately well drained soils that formed in sandy deposits in which the median particle size is near the boundary between fine sand and very fine sand. These soils have a textural B horizon that is banded or diffuse. They are in the same drainage sequence as the well-drained Arkport soils, the somewhat poorly drained Minoa soils, and the poorly drained or very poorly drained Lamson soils. The Galen soils are lower in silt and clay content than the Collamer soils, and they lack a textural B horizon having uniform texture and blocky structure. They are higher in silt content than the Elnora soils, and they contain more numerous or thicker and more strongly expressed bands than those soils. The Galen soils have a lower content of coarse silt than the Scio soils, which lack the textural bands. Galen soils occur mostly in the basins of Tonawanda and Oak Orchard Creeks, but there is a smaller acreage in the basins of Black and Oatka Creeks.

Typical profile of Galen very fine sandy loam (in a nearly level cultivated field, 1½ miles west of the hamlet of Bushville):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; weak, fine, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

A2—9 to 15 inches, yellowish-brown (10YR 5/4) very fine sandy loam; very weak, fine, granular structure; friable; common fine roots; moderately acid; clear, wavy boundary. Horizon is 3 to 9 inches thick.

B1—15 to 20 inches, brown (10YR 5/3) very fine sandy loam; common, fine, distinct mottles of strong brown (7.5YR 5/6); very weak, fine, subangular blocky structure; friable; few fine roots; slightly acid; clear, wavy boundary. Horizon is 3 to 8 inches thick.

B2t—20 to 40 inches, pale-brown (10YR 6/3) loamy very fine sand that is single grain (structureless), is very friable, and contains a few, medium, distinct mottles of strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2); this layer interspersed with bands of brown (7.5YR 4/4) very fine sandy loam, 1 inch to 2 inches thick and 6 to 8 inches apart; bands contain a few, faint, yellowish-brown mottles and have weak to moderate, fine, subangular blocky structure; they are slightly plastic and slightly sticky when wet; neutral or mildly alkaline; gradual, smooth boundary. Horizon is 17 to 24 inches thick.

C—40 to 50 inches +, strata of pinkish-gray (7.5YR 6/2) loamy very fine sand, fine sand, and coarse silt; few, medium, distinct mottles of yellowish brown (10YR 5/4); slightly firm in place; calcareous.

The texture of the A horizon generally is very fine sandy loam or fine sandy loam. The median particle size is near the boundary separating fine sand and very fine sand, and either separate may be dominant. The content of medium sand and of clay is low. At the coarsest end of the textural range, the B horizon is mainly loamy fine sand but includes bands of light fine sandy loam that aggregate at least 6 inches in total thickness. Soils in which the sand is coarser than the texture just named and the particles are of uniform size are identified as the Elnora soils. Stratification is common, and layers of silt loam make up as much as 30 percent of the B horizon in some places. In these layers, however, the grade of structure is no stronger than moderate. The percentage of clay in the bands is normally about 10 percent, but in places it is as much as 15 percent. Hues generally are 10YR or 7.5YR, though in many places the finer textured bands have hues of 5YR. In the B2t horizon the low-chroma mottles are lacking in some places. The reaction in the solum ranges from moderately acid to mildly alkaline. Carbonates are at a depth of 24 to 50 inches. Soils in which mottles are lacking to a depth of 20 inches are identified as the Arkport soils. Soils that are distinctly mottled at a depth of 12 to 18 inches are identified as the Minoa soils. The depth to bedrock ranges from 5 to 50 feet.

Genesee Series

The Genesee series consists of well-drained, medium-textured soils that formed in recent alluvium washed from calcareous glacial drift or from soils formed in such material. Genesee soils are in the same drainage sequence as the moderately well drained Eel soils, the somewhat poorly drained or poorly drained Wayland soils, and the very poorly drained Sloan soils. The Genesee soils lack the developed profile of the Arkport and Dunkirk soils, and generally they are darker colored below the plow layer. They lack the coarse fragments and the profile development of the Palmyra soils. Most of the acreage of Genesee soils is along Tonawanda Creek between Batavia and Attica.

Typical profile of Genesee silt loam (in a level cultivated field, one-half mile southeast of the village of Alexander):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

C1—10 to 24 inches, dark grayish-brown (10YR 4/2) silt loam; very weak, medium, subangular blocky structure; friable; neutral; worm casts; clear, smooth boundary. Horizon is 6 to 20 inches thick.

C2—24 to 42 inches, dark-brown (10YR 3/3) to very dark grayish-brown (10YR 3/2) silt loam; massive (structureless); some worm casts; neutral to weakly calcareous.

The texture varies throughout the profile. Layers of fine sandy loam are stratified with layers of silt loam or heavy silt loam. In the control section, silt makes up more than 50 percent of the volume; clay, less than 18 percent; and sands coarser than very fine, less than 15 percent. In the Ap horizon the color may be dark grayish brown (10YR 4/2), but in only a few places are the value and chroma higher than those given in the typical profile. When crushed, the soil material may be very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2) throughout the profile. Generally, the crushed colors are one unit of value lighter than the uncrushed, especially in the darker colors. The reaction is slightly acid or neutral in the Ap horizon and is neutral to calcareous in the lower part of the control section. In some places the profile shows no structure below the Ap horizon. The depth to bedrock ranges from 20 to 60 feet.

In this county, soils of the Genesee series are more silty and are coarser textured than soils typical for the series.

Halsey Series

The Halsey series consists of poorly drained soils that formed in calcareous glacial outwash derived chiefly from limestone and sandstone and partly from shale. These soils are in the same drainage sequence as the somewhat poorly drained Fredon soils, the moderately well drained Phelps soils, and the well drained Palmyra soils. The Halsey soils have a profile that is similar to the one of the Lyons soils, but they contain strata of sand and gravel, whereas the Lyons soils formed in firm glacial till consisting of loam or silt loam. The rounded gravel that occurs in the Halsey soils is lacking in the Lamson and Canandaigua soils. Halsey soils are mainly in pocketed areas on outwash terraces and along foot slopes of kame terraces that are scattered along the major drainageways in the county.

Typical profile of Halsey silt loam (in a nearly level pastured field, 1 mile southeast of the village of Alexander):

Ap1—0 to 7 inches, very dark brown (10YR 2/2) silt loam; many fine mottles; very weak, fine, granular structure; friable; neutral; abrupt, smooth boundary. Horizon is 4 to 12 inches thick.

Ap2—7 to 9 inches, very dark gray (10YR 3/1) silt loam; few, fine, distinct mottles of gray (10YR 5/1), brown (10YR 5/3) and yellowish brown (10YR 5/6); weak, medium, granular structure; friable; many fine roots; neutral; abrupt, wavy boundary. Horizon is 0 to 3 inches thick.

IIA2g—9 to 12 inches, grayish-brown (10YR 5/2) gravelly sandy loam; few, fine, distinct mottles of yellowish brown (10YR 5/6); very weak, medium, subangular blocky structure; very friable; few fine roots; neutral; clear, wavy boundary. Horizon is 2 to 5 inches thick.

IIB2g—12 to 16 inches, brown (10YR 5/3) gravelly sandy loam, slightly heavier than material in IIA2g horizon; few, fine, faint mottles of dark yellowish brown (10YR 4/4); weak, coarse, subangular blocky structure; very friable; few fine roots; mildly alkaline; clear, wavy boundary. Horizon is 3 to 10 inches thick.

IIC1—16 to 30 inches, dark grayish-brown (10YR 4/2) gravelly sand that contains 30 to 40 percent coarse fragments; these include pebbles of limestone, sandstone, and black shale; single grain; loose; calcareous; abrupt, wavy boundary. Horizon is 12 to 17 inches thick.

IIIC2—30 to 45 inches +, very dark grayish-brown (10YR 3/2), salt- and pepper-colored fine and medium sands; strata of fine gravel are erratically spaced; single grain; loose when moist; calcareous.

In the Ap horizon, the texture ranges from fine sandy loam to silt loam and the content of coarse fragments from 0 to 20 percent. Strata of sand and gravel vary greatly in thickness and particle size. The depth of sand and gravel over contrasting deposits, such as glacial till or lacustrine clay, ranges from 3 to 8 feet or more. The depth to carbonates is 16 to 30 inches, and to bedrock, 10 to 40 feet.

In the Halsey soils in Genesee County, the B horizon is browner than typical for the series.

Hilton Series

The Hilton series consists of moderately well drained soils that formed in medium-textured, calcareous glacial till. These soils are in the same drainage sequence as the well-drained Ontario soils, the somewhat poorly drained Appleton soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. The Hilton soils have a prominent A2 horizon and a textural B horizon, and they are similar to the Conesus soils in these respects, but the Hilton are reddish brown, whereas the Conesus are grayish brown. Hilton soils have a thicker A2 horizon and a thicker solum than the Lima and Mohawk soils, and, unlike those soils, they do not have a high base status. They are not so fine textured as the Cazenovia soils. The Hilton soils occupy nearly level and gently sloping areas scattered across the northern half of the county.

Typical profile of Hilton loam (in a cultivated field having a slope of 4 percent, 2 miles east of the village of Byron):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loam that contains a few pebbles; weak, fine, granular structure; very friable; many fine roots; moderately acid; abrupt, smooth boundary. Horizon is 7 to 11 inches thick.

A2—9 to 17 inches, brown to pale-brown (10YR 5/3–6/3) loam; few, medium, faint mottles of dark yellowish brown (10YR 4/4) in lower part; weak, thin and medium, platy structure; friable; moderately acid; abrupt, irregular boundary. Horizon is 5 to 14 inches thick.

B21—17 to 24 inches, reddish-brown (5YR 4/3) gritty heavy loam; 10 percent gravel fragments; few, medium, faint mottles of yellowish brown; interfingering of material from A2 horizon surrounding some peds in upper part; weak, medium, subangular blocky structure; slightly firm; slightly acid; clear, wavy boundary. Horizon is 5 to 9 inches thick.

B22t—24 to 36 inches, reddish-brown (5YR 4/3) gritty light clay loam; 10 percent gravel; common, fine, distinct mottles of yellowish brown (10YR 5/4) and pinkish gray (7.5YR 6/2); moderate, medium, subangular blocky structure; slightly firm to firm; neutral; clear, wavy boundary. Horizon is 10 to 18 inches thick.

C—36 to 45 inches +, reddish-brown to brown (5YR 5/3 to 7.5YR 5/2) gravelly loam; moderate, medium, platy structure; firm; calcareous.

In Genesee County the Ap horizon is only loam. The B22t horizon ranges from loam to clay loam in texture and from 15 to 28 percent in clay content. The thickness of the A2 horizon varies widely within the same field, but in most places the part of this horizon that remains after normal plowing is 2 to 10 inches thick. The A2 horizon may have common, faint or distinct mottles if the B horizon is unmottled, or both horizons may contain a few, fine, faint or distinct mottles. Soils that contain more mottles are identified as Appleton soils. Carbonates occur at a depth ranging from 30 to 42 inches. The solum is moderately acid or slightly acid in the A horizon and is slightly acid or neutral in the B horizon. Rounded pebbles make up less than 5 to about 20 percent of the A horizon, and coarse fragments make up 10 to 25 percent of the B and C horizons. In the B22t horizon the low-chroma mottles are lacking in some places. Hues are dominantly 7.5YR or redder throughout the profile. In places where the profile is grayer,

the soil is identified as one of the Conesus series. The depth to bedrock ranges from 4 to 25 feet.

Holly Series

In the Holly series are poorly drained, acid soils that formed in acid alluvium recently washed from uplands underlain mainly by gray sandstone, siltstone, and shale. These soils are in the same drainage sequence as the moderately well drained Middlebury soils. They are the acid analogs of the Wayland soils. The Holly soils are darker colored immediately below the A1 horizon than the Canandaigua and Lamson soils. They lack the rounded pebbles of the Fredon soils. Holly soils occur with the Allis soils, which lie at the heads of drainageways and formed in glacial till. The Holly soils are mainly in wet alluvial areas along the major streams in the southwestern part of the county.

Typical profile of Holly silt loam (in a nearly level pastured field, 2 miles west of the village of Darien Center):

A1—0 to 8 inches, very dark grayish-brown (2.5Y 3/2) silt loam; few mottles; moderate, medium, granular structure; friable; many fine roots; moderately acid; clear, smooth boundary. Horizon is 4 to 10 inches thick.

C1g—8 to 13 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, distinct mottles of dark yellowish brown (10YR 4/4); moderate, coarse, granular structure; friable; few fine roots; strongly acid; gradual, smooth boundary. Horizon is 3 to 9 inches thick.

C2g—13 to 25 inches, gray (5Y 5/1) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/4); very weak, medium, subangular blocky structure; slightly firm; no roots; strongly acid; clear, smooth boundary. Horizon is 6 to 16 inches thick.

C3—25 to 40 inches +, dark-gray (5Y 4/1) silt loam; few distinct strong stains of brown (7.5YR 5/6); massive; slightly firm; moderately acid.

The clay content in the solum ranges from 18 to 35 percent. Less than 15 percent of any one horizon is coarser textured than very fine sand. The reaction is strongly acid or medium acid in the A horizon and is medium acid or slightly acid in the lower part of the control section. The colors vary little from those in the typical profile. In areas where a thin, mottle-free zone is just below a normal Ap horizon, the soils are identified as the better drained Middlebury soils.

Honeoye Series, Moderately Deep Variant

The Honeoye series, moderately deep variant, consists of well-drained soils that formed in medium-textured, calcareous glacial till made up chiefly of limestone and shale. These soils have a very thin A2 horizon and a weakly expressed textural B horizon. They are in the same drainage sequence as the moderately well drained Lima soils, the somewhat poorly drained Kendaia soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. These Honeoye soils are similar to the Mohawk soils in some respects, but in their B horizon the structure is medium blocky, whereas in that of the Mohawk it is fine blocky. Also, the color values in the Honeoye soils are at least one unit lighter than they are in the Mohawk soils. The Honeoye soils have a much thinner A2 horizon and are higher in base status than the Ontario and Lansing soils. They are not so fine textured as the Cazenovia and Darien soils. Honeoye soils occupy gently undulating to strong, convex slopes, mostly near the limestone escarpment across the central part of the county.

Typical profile of Honeoye silt loam, moderately deep variant (in a nearly level cultivated field, 3 miles northwest of the village of Le Roy):

Ap—0 to 9 inches, dark grayish-brown to very dark grayish-brown (10YR 4/2–3/2) silt loam; weak, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

A2—9 to 10 inches, grayish-brown to brown (10YR 5/2–5/3) silt loam; weak, medium, platy structure to weak, fine, subangular blocky structure; friable; common fine roots; neutral; discontinuous, abrupt, wavy boundary. Horizon is 0 to 2 inches thick.

B2t—10 to 23 inches, brown (7.5YR 4/4) heavy silt loam; interfingering of material from A2 horizon surrounds some small peds in upper part; few rock fragments; few grayish-brown clay films in pore spaces; moderate, medium, subangular blocky structure; slightly firm; few fine roots; mildly alkaline; clear, wavy boundary. Horizon is 10 to 17 inches thick.

IIC—23 to 30 inches, brown (7.5YR 5/2–5/4) flaggy loam; weak, medium, platy structure; slightly firm; calcareous; abrupt, smooth boundary. Horizon is 3 to 8 inches thick.

R—30 inches +, grayish limestone bedrock.

In Genesee County the Ap horizon is only silt loam. Clay makes up 18 to 27 percent of the B horizon. A thin A2 horizon is present in some places, but generally it is destroyed by plowing to a 9- to 11-inch depth. In places where the A2 horizon extends below a 12- or 13-inch depth, the Honeoye soils intergrade to the Ontario or Lansing soils. Colors range from 5YR to 10YR in hue. Values and chromas vary little from those in the typical profile. Where the values are one unit or more lower in the B horizon, the Honeoye soils intergrade to the Mohawk soils. The pH ranges from 6.5 to 7.5 in the solum. The depth to carbonates ranges from 20 to 30 inches. From 5 to 25 percent of the soil mass is coarse fragments; these vary little from limestone and flinty chert fragments to cobblestones and pebbles of various sizes. The depth to hard rock, which is mainly limestone, ranges from 20 to 40 inches.

Hornell Series

The Hornell series consists of moderately fine textured, moderately well drained and somewhat poorly drained soils that formed in glacial till, dominantly acid gray shale. These soils are in the same drainage sequence as the poorly drained Allis soils. They are more acid than the Remsen soils, and they lack the textural B horizon of those soils. Hornell soils are finer textured than the Fremont soils. They are lower in base status than the Darien soils, which have an argillic horizon. The Hornell soils have convex slopes and are at the higher elevations from Linden westward along the Wyoming County line.

Typical profile of Hornell silty clay loam (in a hayfield having a slope of 4 percent, 2 miles south of the village of Darien City):

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, medium, granular structure; friable; very strongly acid; abrupt, smooth boundary. Horizon is 5 to 9 inches thick.

B21—6 to 14 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, faint mottles of yellowish brown (10YR 5/6), and distinct mottles of light brownish gray (2.5Y 6/2); moderate, medium, subangular blocky structure; friable; very strongly acid; clear, wavy boundary. Horizon is 6 to 11 inches thick.

B22—14 to 20 inches, pale-brown (10YR 6/3) silty clay loam interiors, and grayish-brown (2.5Y 5/2) ped coats; many, medium, distinct mottles of gray (10YR 5/1),

and prominent mottles of brown and strong brown (7.5YR 5/4 and 5/6); strong, medium, angular blocky structure within moderate, medium, prismatic structure; slightly firm when moist; pH 5.0; clear, smooth boundary. Horizon is 5 to 8 inches thick.

B23g—20 to 30 inches, gray (10YR 5/1) silty clay; few olive-gray (5Y 5/2) silt coatings on prism faces; many, medium, prominent mottles of strong brown (7.5YR 5/6); moderate, medium, platy structure within weak, coarse, prismatic structure; firm; very strongly acid; gradual, smooth boundary. Horizon is 8 to 12 inches thick.

IICg—30 to 36 inches +, gray (N 5/0) shaly silty clay (fractured bedrock); streaked with many, prominent, olive-brown (2.5Y 4/4) and yellowish-brown (10YR 5/6) mottles; moderate, medium, platy structure; firm; very strongly acid.

The texture of the Ap horizon ranges from silt loam to silty clay loam. The B horizon ranges from silty clay loam to clay in texture and from 35 to 60 percent in clay content. Generally, there are a few coarse fragments, most of which are acid, brittle shale. The depth to shale bedrock ranges from 20 to 40 inches. The shale is soft and readily weathered. In most places the colors range from 10YR to 5Y in hue; the more olive colors occur in the lower solum. Commonly, the B and C horizons contain many, prominent, yellowish mottles and have a gray matrix. The solum is strongly acid throughout.

Ilion Series

In the Ilion series are deep, poorly drained soils that formed in moderately fine textured glacial till derived mainly from calcareous shale. These soils have a very dark gray A1, or Ap, horizon; a gray or light-gray distinctly mottled A2 horizon; a B horizon having blocky structure; and a calcareous C horizon. They are in the same drainage sequence as the somewhat poorly drained Darien soils and the very poorly drained Alden soils. The Ilion soils are finer textured than the Lyons soils, and they are not reddish like the Romulus soils. They are coarser textured than the Madalin soils, which lack coarse fragments. Ilion soils are less acid throughout the solum than the Allis soils. The Ilion soils occur chiefly in low areas scattered in the southern part of the county.

Typical profile of Ilion silt loam (in a nearly level hayfield, 1 mile northwest of the hamlet of Bethany Center):

Ap—0 to 10 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

A2g—10 to 14 inches, light-gray (10YR 6/1) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/6); very weak, fine, subangular blocky structure; friable; few fine roots; neutral; clear, wavy boundary. Horizon is 3 to 6 inches thick.

B21g—14 to 19 inches, dark grayish-brown (2.5Y 4/2) light silty clay loam; many, medium, distinct mottles of light olive brown (2.5Y 5/6) and gray (5Y 5/1); moderate, medium, subangular blocky structure; slightly firm; no roots; neutral; clear, smooth boundary. Horizon is 3 to 7 inches thick.

B22tg—19 to 28 inches, very dark grayish-brown (2.5Y 3/2) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/4); gray (N 5/0) ped surfaces; some clay films; moderate, medium, blocky structure; firm; mildly alkaline; gradual, smooth boundary. Horizon is 7 to 14 inches thick.

Cg—28 to 40 inches +, very dark grayish-brown (2.5Y 3/2) shaly silty clay loam streaked with many, medium, distinct mottles of olive (5Y 4/3) and light olive brown (2.5Y 5/6); gray (N 5/0) ped faces; moderate, medium, platy structure in upper part; massive in lower part; firm; calcareous.

The A horizon is commonly silt loam but ranges to light silty clay loam. The B horizon is generally light silty clay loam and has a clay content of 28 to 35 percent. In most places the C horizon is only a little lighter textured than the B horizon. Hues range from 10YR to 5Y, and values, from 5 to 3 except in the A2 horizon, where they are higher. The chroma is 2 or 1 and is not higher than 1 in the A2 horizon. Generally, the values are lower in areas near the Mohawk or Manheim soils. In some places the profile ranges from pH 6.0 in the A horizon to pH 7.0 at a 24-inch depth. In other places it is pH 7.0 in the A horizon and calcareous at an 18-inch depth. Bedrock consists mainly of various kinds of shale and occurs at a depth ranging from 40 inches to 20 feet.

Kendaia Series

The Kendaia series consists of somewhat poorly drained soils that formed in medium-textured, high calcareous glacial till. The till is mainly from limestone but includes small amounts of sandstone and shale. In cultivated fields these soils have an Ap horizon, a color B horizon, and a C horizon. The B horizon is only slightly finer textured than the other horizons. The average depth to carbonates is about 20 inches. In undisturbed areas there is an A2 horizon, but this generally is destroyed by plowing. The Kendaia soils are closely associated with the well drained Honeoye soils, the moderately well drained Lima soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. Kendaia soils lack the prominent A2 horizon and the textural B horizon of the Appleton soils. They lack the dark colors of the Manheim soils and the fine angular blocky structure in the B horizon. Kendaia soils formed in medium-textured materials, whereas the Darien and Ovid soils formed in moderately fine textured materials. The Kendaia soils occupy nearly level areas that receive runoff from adjacent soils. They occur mainly in the east-central part of the county.

Typical profile of Kendaia silt loam (in a nearly level cultivated field 1½ miles northwest of the village of Le Roy):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; very friable; neutral; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

B21—9 to 17 inches, brown to dark-brown (7.5YR 4/2–4/4) silt loam; common, fine and medium, distinct mottles of yellowish brown (10YR 5/4) and grayish brown (10YR 5/2); weak, medium, subangular blocky structure; friable to slightly firm; mildly alkaline; clear, wavy boundary. Horizon is 6 to 10 inches thick.

B22—17 to 22 inches, brown (7.5YR 4/2–5/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium to coarse, subangular blocky structure; slightly firm; mildly alkaline to weakly calcareous; clear, wavy boundary. Horizon is 3 to 7 inches thick.

C—22 to 42 inches +, pinkish-gray (7.5YR 6/2) loam that contains a few pebbles; few, medium, faint mottles of yellowish brown (10YR 5/4); weak, medium, platy structure; firm; calcareous.

In this county the A horizon was mapped only as silt loam. The clay content in the B horizon ranges from 18 to 28 percent, and so does the clay content in the control section. Hues in the B horizon range from 5YR to 2.5Y. In areas where the value decreases by one unit or more, the Kendaia soils intergrade to the Manheim soils. They also intergrade to those soils where the structure is fine blocky and an increase in shale content is noted. The pH in the solum ranges from 6.5 to 7.5. Carbonates are at a depth of 15 to 30 inches. In some places the content of coarse fragments ranges from 0 near the surface to 5 or 10 percent in the C horizon.

In other places it is 5 to 25 percent throughout the profile. The surface is stone free in some areas because it has been covered with soil material that washed from higher areas. In places this material is as much as 15 inches thick. The depth to hard rock, mainly limestone, ranges from 40 inches to 40 feet.

Although the Kendaia soils are normally deep, a moderately deep variant was mapped in Genesee County.

Lakemont Series

The Lakemont series consists of poorly drained soils that formed in moderately fine textured or fine textured, reddish, calcareous lacustrine deposits. These soils commonly have a B horizon of silty clay or clay in which there is well-expressed blocky structure within coarse prismatic structure. The surface horizon is generally neutral, and the substratum is calcareous. Lakemont soils are in the same drainage sequence as the well drained or moderately well drained Schoharie soils, the somewhat poorly drained Odessa soils, and the very poorly drained Fonda soils. The Lakemont soils are finer textured than the Canandaigua soils. Although they are similar to the Madalin soils in texture, they formed in reddish materials, whereas the Madalin formed in gray materials. Lakemont soils are finer textured than the Romulus soils, which contain coarse fragments. The Lakemont soils occupy level to depressional areas on the floor of the lake plain. They occur mostly in the basin of Oak Orchard Creek and in the lower basins of Tonawanda and Black Creeks.

Typical profile of Lakemont silty clay loam (in a nearly level pastured field, 2½ miles northwest of the village of Alabama):

Ap—0 to 9 inches, very dark brown (10YR 2/2) silty clay loam; moderate, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

A2g—9 to 14 inches, gray (10YR 5/1) silty clay loam; common, fine, distinct mottles of brown (7.5YR 4/4); weak, fine, subangular blocky structure; friable to slightly firm; few fine roots; neutral; clear, wavy boundary. Horizon is 2 to 8 inches thick.

B21t—14 to 20 inches, brown (7.5YR 5/2) silty clay; many medium, distinct mottles of light gray (10YR 6/1) and strong brown (7.5YR 5/6); moderate, fine and medium, angular blocky structure within moderate, medium, prismatic structure; common clay films on ped surfaces and in pores; firm when moist, sticky when wet; neutral; clear, wavy boundary. Horizon is 4 to 9 inches thick.

B22t—20 to 31 inches, reddish-brown (5YR 4/3) clay; common, medium, faint mottles of reddish brown (5YR 4/4) and reddish gray (5YR 5/2); strong, medium, angular blocky structure within moderate, coarse, prismatic structure; firm when moist, sticky when wet; numerous clay films on ped surfaces; mildly alkaline; clear, smooth boundary. Horizon is 9 to 13 inches thick.

C—31 to 40 inches +, reddish-brown (5YR 5/3) silty clay loam; common, medium, faint mottles; moderate, medium and thick, platy structure; slightly firm; strongly calcareous, with lime segregated in streaks.

The Ap horizon is mainly silt loam or silty clay loam. In the B horizon the clay content ranges from 35 to 60 percent. Generally, the profile is free of coarse fragments. The solum is slightly acid to mildly alkaline. The depth to carbonates ranges from 24 to 42 inches. The Ap horizon is 10YR 3/1 or 2/2. Hues of 7.5YR or redder are dominant in the B horizon, together with values of 5 to 3 and chromas of 3 and 2. In places where the Lakemont soils intergrade to the Odessa soils, the A2g horizon has a chroma of 2. The depth to bedrock ranges from 6 to 30 feet.

Lamson Series

In the Lamson series are poorly drained or very poorly drained soils that formed in fine sand and very fine sand deposited in glacial lakes. These soils have a very dark A1, or Ap, horizon that is high in organic-matter content; a gleyed A2 horizon; and a mottled B horizon that contains only slightly more clay than the A and C horizons. They consist dominantly of very fine sand and fine sand, have a relatively low content of coarse silt, and contain very little clay. Stratification is common, however, and layers of silt occur in the solum and substratum. The Lamson soils are in the same drainage sequence as the somewhat poorly drained Minoa soils, the moderately well drained Galen soils, and the well drained Arkport soils. Lamson soils are not so coarse textured as the Colonie soils, which are made up principally of fine sand, but they are coarser textured than the Canandaigua soils and do not have the blocky and prismatic structure of those soils. They lack the gravel that occurs in the Halsey soils. The Lamson soils occupy low, level or concave areas in all parts of the county except the high plateau.

Typical profile of Lamson very fine sandy loam (in a level cultivated field, 1 mile north of the city of Batavia):

Ap—0 to 10 inches, very dark gray (10YR 3/1) very fine sandy loam; weak, fine, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

A2g—10 to 15 inches, light-gray (10YR 6/1) loamy very fine sand; few, fine, distinct mottles of yellowish brown (10YR 5/4); single grain; loose; few fine roots; neutral; clear, wavy boundary. Horizon is 2 to 7 inches thick.

B21g—15 to 22 inches, brown (7.5YR 5/2) very fine sandy loam; many, fine and medium, distinct mottles of yellowish brown (10YR 5/6) and dark brown (7.5YR 4/4); few, light-gray (10YR 6/1–7/1), bleached sand grains; very weak subangular blocky structure; friable to slightly firm; neutral; gradual, wavy boundary. Horizon is 5 to 10 inches thick.

B22g—22 to 38 inches, grayish-brown to light brownish-gray (10YR 5/2–6/2) very fine sandy loam, high in content of coarse silt; few yellowish-brown (10YR 5/6) mottles; varved with light-gray (10YR 6/1) loamy very fine sand that contains common, medium, distinct mottles of brown to yellowish brown (10YR 5/3 to 5/6); mass is yellowish brown (10YR 5/4) when crushed; very fine sandy loam occurs in ½-inch varves that make up about 25 percent of entire horizon; very weak, thick, platy structure; slightly firm; friable; mildly alkaline; gradual, smooth boundary. Horizon is 14 to 18 inches thick.

C—38 to 45 inches +, grayish-brown (10YR 5/2) very fine sand; few, fine, faint mottles and manganese stains; massive or single grain; slightly firm in place, very friable if removed; calcareous.

Typically, the solum consists mainly of particles that are near the size that separates fine sand and very fine sand, but it includes a significant amount of sand of both sizes. Below the solum there are layers of fine sand or very fine sand, as well as layers of very fine sandy loam or silt loam. The clay content generally is only about 5 percent, but in some layers it is as much as 15 percent. The solum ranges from slightly acid to mildly alkaline. Carbonates occur at a depth ranging from 24 inches to as much as 5 feet. The finest textured part of the B horizon is friable or slightly firm, but the coarsest textured part is very friable or loose. The Ap horizon is 10YR 3/1 or 2/2. In areas where the Lamson soils intergrade to the Minoa soils, the A2g horizon has a chroma of 2. The depth to bedrock ranges from 8 to 40 feet.

Lansing Series

The Lansing series consists of well-drained soils that formed in medium-textured, calcareous glacial till. The till is chiefly limestone and shale but includes some sandstone. These soils are in the same drainage sequence as the moderately well drained Conesus soils, the somewhat poorly drained Appleton soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. Lansing soils have a prominent A2 horizon and a degrading textural B horizon that contains illuvial clay. In these respects they are similar to the Ontario soils, but the Lansing are grayish brown and the Ontario are reddish brown. The Lansing soils have a thicker solum than the Honeoye and Mohawk soils, for in those soils the A2 horizon is very thin or missing. Lansing soils are not so well textured as the Darien soils. Their textural B horizon is coarser textured than that of the Nunda soils, which formed in deposits of contrasting texture. The Lansing soils occupy gently sloping to moderately steep, distinctly convex areas in the southeastern part of the county.

Typical profile of Lansing silt loam (in a hayfield having a slope of 10 percent, 2½ miles south-southeast of Texaco Town):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam that is 10 percent gravel; weak to moderate, fine, granular structure; very friable; many fine roots; moderately acid; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

A2—9 to 16 inches, brown to pale-brown (10YR 5/3–6/3) coarse silt loam that is 5 percent gravel; weak to moderate, medium, platy structure; friable; common fine roots; moderately acid; clear, smooth boundary. Horizon is 2 to 12 inches thick.

B21t—16 to 22 inches, brown (10YR 4/3) silt loam that is 5 to 10 percent stone fragments; weak, fine, subangular blocky structure; interfingering of material from A2 horizon completely surrounds some peds in upper part; friable; few fine roots; slightly acid; clear, wavy boundary. Horizon is 2 to 8 inches thick.

B22t—22 to 36 inches, brown (10YR 4/3) heavy silt loam to light silty clay loam that is 5 to 10 percent stone fragments; some dark grayish-brown (10YR 4/2) clay films in pores in lower part; moderate, medium, subangular blocky structure; slightly firm; few fine roots in upper part; neutral; clear, wavy boundary. Horizon is 10 to 18 inches thick.

C—36 to 45 inches +, dark grayish-brown (2.5Y 4/2) gravelly loam; moderate, medium, platy structure; firm; calcareous.

In Genesee County the Ap horizon is only silt loam. The A2 horizon varies widely in thickness within the same field, but after normal plowing the remaining part of this horizon generally is 2 to 12 inches thick. The clay content of the B horizon ranges from 18 to 28 percent. Evidence of degradation is moderate to strong. Coarse fragments make up 5 to 10 percent of the upper solum and 10 to 30 percent of the lower solum and substratum. The solum is strongly acid or moderately acid in the A horizon and slightly acid or nearly neutral in the B horizon. The depth to carbonates ranges from 36 to 42 inches. The profile is dominantly 10YR or grayer. Bedrock occurs at a depth ranging from 4 to 60 feet.

Lima Series

In the Lima series are moderately well drained soils that formed in medium-textured, calcareous glacial till consisting mainly of limestone and shale. In undisturbed areas these soils have a very thin A2 horizon and a textural B horizon. The lower part of the solum is mottled to some degree. The Lima soils are in the same drainage sequence as the well-drained Honeoye soils, the somewhat poorly drained Kendaia soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. In contrast to the Mohawk soils, the Lima soils show interfingering of material from the A horizon in the upper part of the B horizon. They have a thinner solum but are higher in base status than the Hilton and Conesus soils, and unlike those soils, they do not have a prominent A2 horizon. The Lima soils are not so fine textured as the Cazenovia and Darien soils. Lima soils occupy nearly level and gently sloping areas that lie in an east-west band through the center of Genesee County. The band is widest in the eastern part of the county.

Typical profile of Lima silt loam (in a nearly level cultivated field, 2 miles south of the village of Le Roy):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam (10 percent gravel); weak, medium, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

B2t—9 to 21 inches, dark-brown (7.5YR 4/4) heavy silt loam or light silty clay loam (5 percent gravel); degraded areas or interfingering surrounding some peds in upper part; few to common, fine, faint mottles of strong brown (7.5YR 5/6), and distinct mottles of grayish brown (10YR 5/2); common clay films in lower part; moderate, medium, subangular blocky structure; friable to slightly firm; few fine roots; mildly alkaline; clear, wavy boundary. Horizon is 9 to 13 inches thick.

C1—21 to 32 inches, brown (7.5YR 5/2–5/4) gritty silt loam; moderate, medium, platy structure; firm; few fine roots; calcareous; gradual, smooth boundary. Horizon is 5 to 13 inches thick.

C2—32 to 45 inches +, grayish-brown (10YR 5/2) gritty loam; about 10 percent coarse stone fragments; moderate, thick, platy structure; firm; calcareous.

In Genesee County the A horizon was mapped only as silt loam. The clay content in the B horizon ranges from 18 to 28 percent. A thin A2 horizon occurs in some places, but most commonly it is destroyed by plowing to a depth of 9 to 11 inches. Soils in which an A2 horizon extends to a depth of more than 12 or 13 inches and degradation is more conspicuous in the B horizon are identified as the Hilton or Conesus soils. Hues range from 5YR to 10YR. Values vary little from those given in the typical profile. In areas where the values are one unit or more lower, the Lima soils intergrade to the Mohawk soils. They also intergrade to Mohawk soils where structure in the B horizon is fine blocky and where an increase in the shale content is noted. In the B2t horizon the low-chroma mottles are lacking in some places. The pH of the solum ranges from 6.5 to 7.5. The depth to carbonates is 15 to 30 inches. From 5 to 25 percent of the soil mass consists of coarse fragments; these are cobblestones, channery fragments, pebbles, or other glacial erratics. The depth to hard rock, mainly limestone, generally ranges from 40 inches to many feet. Lima soils that are only 20 to 40 inches deep were classified and mapped as moderately deep variants.

Lyons Series

The Lyons series consists of poorly drained soils that formed in medium-textured, highly calcareous glacial till containing limestone, sandstone, and shale. These soils have a dark-gray A1, or Ap, horizon; a gray to light-gray A2 horizon that is marked with few to common, distinct mottles; and a B horizon that is nearly the same texture as the A2 horizon but generally contains many, distinct mottles. The C horizon is loamy, compact, calcareous glacial till. The Lyons soils are in the same drainage sequence as the very poorly drained Alden soils, the somewhat poorly drained Kendaia and Appleton soils,

the moderately well drained Lima, Hilton, and Conesus soils, and the well drained Honeoye, Ontario, and Lansing soils. The Lyons soils formed in medium-textured materials, whereas the Ilion and Romulus soils formed in moderately fine textured materials. Lyons soils generally are finer textured than the Halsey soils, which contain many rounded pebbles and lack the compactness of the Lyons soils. In contrast to the silty Canandaigua soils and the sandy Lamson soils, the Lyons soils contain coarse fragments and are of uniform texture. The Lyons soils occupy low depressions in areas of glacial till. They occur at all elevations except the higher ones in the southern part of the county.

Typical profile of Lyons silt loam (in a depressional area in an old hayfield, 2 miles northwest of the village of Le Roy):

Ap—0 to 9 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2g—9 to 13 inches, light-gray (10YR 6/1) silt loam; common, medium, distinct mottles of dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6); very weak, fine, subangular blocky structure within thick platy structure; friable; few fine roots; neutral; abrupt, wavy boundary. Horizon is 3 to 6 inches thick.

B2g—13 to 27 inches, brown (7.5YR 5/2) to dark grayish-brown (10YR 4/2) heavy silt loam (5 percent gravel); many, medium, distinct mottles of light gray (10YR 6/1) and yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; friable to slightly firm; no roots; mildly alkaline in upper part, weakly calcareous in lower part; clear, wavy boundary. Horizon is 5 to 11 inches thick.

C—27 to 40 inches +, grayish-brown (10YR 5/2) gravelly loam; many, fine and medium, distinct mottles of brown (7.5YR 5/4) and yellowish brown (10YR 5/6); commonly mottled in lower part; weak, medium, platy structure; slightly firm to firm; calcareous.

The A horizon generally is silt loam, but locally it is loam. In places this horizon is thicker than the typical one because it has been covered by local alluvium. The color of the Ap horizon is 10YR 3/1 to 2/2. The content of clay in the B horizon ranges from 18 to 28 percent. Hues range from 2.5Y to 5YR. The reaction is slightly acid to alkaline. The depth to carbonates ranges from 15 to 36 inches. Normally, coarse fragments make up as much as 15 percent of the soil mass, but the surface horizon is nearly free of coarse fragments in areas that have been influenced by local alluvium. In places where the A2g horizon has a chroma of 2 and contains many mottles, the Lyons soils intergrade to the better drained Kendaia or Appleton soils. The depth to bedrock ranges from 5 to 30 feet.

Madalin Series

The Madalin series consists of poorly drained soils that formed in moderately fine textured or fine textured, grayish lacustrine deposits. These soils commonly have a B horizon of silty clay in which a generally well-expressed blocky structure occurs within coarse prismatic structure. The surface horizon is neutral in most places, but the lower part of the solum is calcareous. The Madalin soils are in the same drainage sequence as the somewhat poorly drained Rhinebeck soils and the very poorly drained Fonda soils. They are finer textured than the Canandaigua and Ilion soils, and they lack the coarse fragments contained in the Ilion soils. In the solum they do not have the reddish hues of the Lakemont soils. The Madalin soils occur throughout most of Genesee County. The largest acreage lies south of Batavia.

Typical profile of Madalin silty clay loam (in a level pasture field, 3 miles south of the city of Batavia):

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2g—8 to 11 inches, light-gray (10YR 6/1) silty clay loam; few, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; slightly firm; neutral; clear, wavy boundary. Horizon is 2 to 4 inches thick.

B21t—11 to 18 inches, grayish-brown (2.5Y 5/2) silty clay; common, fine, distinct mottles of yellowish brown (10 YR 5/6) and gray (5Y 5/1); moderate, medium, subangular blocky structure; common clay films on ped surfaces; firm; neutral; clear, smooth boundary. Horizon is 5 to 9 inches thick.

B22t—18 to 30 inches, gray (5Y 5/1) silty clay; common, medium, distinct mottles of yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6); moderate, medium, angular blocky structure within moderate, medium, prismatic structure; many continuous clay films on ped surfaces; firm; mildly alkaline; clear, smooth boundary. Horizon is 10 to 15 inches thick.

Cg—30 to 40 inches +, gray (10YR 5/1) silty clay, and strata of silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/4); moderate, coarse plates within weak, very coarse prisms; firm; calcareous.

The Ap horizon generally is silty clay loam, but in places it ranges to silt loam. This horizon has a value of 3 or 2. Its pH ranges from 6.5 to 7.2. The B horizon typically is silty clay or clay and has a clay content of 35 to 55 percent. The depth to carbonates is 2 to 4 feet. In areas where the Madalin soils are near the Remsen soils, the lower part of the B horizon and the C horizon contain a few shale fragments. The depth to bedrock ranges from 5 to 40 feet.

Manheim Series

In the Manheim series are somewhat poorly drained and moderately well drained soils that formed in medium-textured, strongly calcareous glacial till made up chiefly of very dark brown to black, calcareous shale. These soils have a B horizon that contains illuvial clay and has fine blocky structure. They generally lack a distinctive A2 horizon, and their B horizon shows no interfingering of material from the A horizon. The Manheim soils are in the same drainage sequence as the well-drained Mohawk soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. They are not so fine textured as the Darien soils. The dark colors and fine blocky structure in the B horizon of Manheim soils are lacking in the B horizon of the Appleton and Kendaia soils. Manheim soils occupy nearly level and gently sloping areas that lie in a band 3 to 4 miles wide, west of Batavia and just south of State Route 33.

Typical profile of Manheim silt loam (in a nearly level cultivated field, 3 miles southwest of the city of Batavia):

Ap—0 to 9 inches, very dark grayish-brown to very dark brown (10YR 3/2 to 2/2) silt loam; moderate, medium and fine, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

AB—9 to 10 inches, brown (10YR 4/3) silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, granular structure; friable; few fine roots; neutral; abrupt, wavy boundary. Horizon is 0 to 4 inches thick.

B2t—10 to 24 inches, dark-brown (10YR 3/3) heavy silt loam to light silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/4), and faint mottles of dark grayish brown (10YR 4/2); moderate, fine, subangular to angular blocky structure; moderate, thin clay films on ped faces in lower part; friable; few fine roots; mildly alkaline; clear, wavy boundary. Horizon is 10 to 16 inches thick.

C—24 to 36 inches +, dark grayish-brown to very dark grayish-brown (10YR 4/2 to 3/2) shaly silt loam; few, fine, faint mottles of dark yellowish brown (10YR 4/4); massive (structureless) to very weak, medium, subangular blocky structure; slightly firm; calcareous.

The clay content in the B horizon ranges from 18 to 28 percent. The solum is lightly acid to mildly alkaline. Carbonates are at a depth ranging from 20 to 36 inches. Coarse fragments make up 5 to 20 percent of the solum and 10 to 25 percent of the substratum. Bedrock is mainly hard shale and occurs at a depth of 3½ to 10 feet or more.

Manlius Series

In the Manlius series are well-drained soils that formed in medium-textured, acid glacial till consisting mainly of acid, brittle, dark-gray or black shale. The upper part of the solum generally is shaly, and the lower part is very shaly. These soils are in the same drainage sequence as the moderately well drained Marilla soils. They have a lighter colored solum and a lower base status than the Mohawk soils. They are lower in base status than the Benson soils. The Manlius soils have gentle to steep, mostly convex slopes and occur at the higher elevations in the southwestern part of the county.

Typical profile of Manlius very shaly silt loam (in a hayfield having a slope of 6 percent, 2½ miles south of the village of Darien):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) very shaly silt loam (50 percent shale fragments); weak, fine, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary. Horizon is 4 to 9 inches thick.

B21—7 to 14 inches, yellowish-brown (10YR 5/4) very shaly silt loam (55 percent shale fragments); very weak, fine, subangular blocky structure; friable; few fine roots; strongly acid; clear, smooth boundary. Horizon is 4 to 9 inches thick.

B22—14 to 22 inches, dark yellowish-brown (10YR 4/4) very shaly silt loam (60 percent shale fragments); very weak, fine, subangular blocky structure; friable; few fine roots; strongly acid; clear, smooth boundary. Horizon is 6 to 11 inches thick.

C—22 to 30 inches, dark grayish-brown to brown (10YR 4/2 to 4/3) very shaly loam (about 60 percent shale fragments, in thin layers); very weak, medium, platy structure; slightly firm in place, friable when removed; no roots; strongly acid; abrupt, wavy boundary. Horizon is 7 to 11 inches thick.

IIR—30 to 40 inches +, black (10YR 2/1), acid, brittle shale bedrock.

The color is 10YR 3/2 or 10YR 4/2 in the Ap horizon, and it ranges from 10YR 4/3 to 10YR 5/6 in the B horizon. The pH in the solum is generally between 5.0 and 5.5. Just above shale bedrock, however, it may be as high as 6.0. In the Ap and B horizons, the texture generally is shaly silt loam but is very shaly silt loam or very shaly loam in small areas, especially in places where the C horizon is missing and where the lower part of the B horizon directly overlies shale bedrock. Most of the shale is black or dark gray, acid, and brittle. In some places, however, there are thin layers of silty, nonbrittle shale or clayey shale, though these layers have not influenced the soil material above them. The depth to bedrock ranges from 20 to 36 inches. Soils in which mottling occurs at a depth of less than 20 inches are identified as Marilla soils.

Marilla Series

In the Marilla series are moderately well drained soils that formed in glacial till consisting dominantly of dark, acid, brittle shale. In these soils a color B horizon overlies a compact, very shaly C horizon. Characteristically, the Marilla soils have a moderately well developed fragipan in very shaly material. They are in the same drainage sequence as the well-drained Manlius soils. The Marilla soils are lower in base status than the Conesus and Darien soils, and they lack the accumulation of clay in the B horizon. They have neither the dark-colored solum of the Manheim and Mohawk soils nor the porous substratum and rounded fragments of the Chenango soils. The Marilla soils are not so fine textured as the Fremont and Hornell soils. Unlike the Fremont soils, they are generally more than 50 percent shale fragments in their lower B and C horizons. The Marilla soils occupy gently convex areas in the southwestern part of the county.

Typical profile of the Marilla shaly silt loam (in a hayfield having a slope of 10 percent, 3 miles southwest of the village of Darien Center):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) shaly silt loam; weak, fine, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary. Horizon is 4 to 9 inches thick.

B21—7 to 15 inches, yellowish-brown (10YR 5/4) shaly silt loam; very weak, fine, subangular blocky structure; friable; common fine roots; strongly acid; clear, smooth boundary. Horizon is 7 to 10 inches thick.

B22—15 to 24 inches, light olive-brown (2.5Y 5/4) to olive-brown (2.5Y 4/4) very shaly silt loam; many, medium, distinct mottles of gray (5Y 5/1) and yellowish brown (10YR 5/6); very weak, coarse, subangular blocky structure that tends toward platy structure; firm; few roots; strongly acid; clear, wavy boundary. Horizon is 7 to 11 inches thick.

C1x—24 to 44 inches, olive-gray (5Y 4/2) very shaly silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/4 and 5/8); massive; very firm; no roots; strongly acid; some erratic, one-fourth inch streaks of gray (5Y 5/1), more friable material present; gradual, smooth boundary. Horizon is 18 to 23 inches thick.

C2x—44 to 62 inches +, dark-gray (5Y 4/1) very shaly loam; many, coarse, distinct mottles of olive (5Y 5/3) and light olive brown (2.5Y 5/4); massive; very firm; strongly acid.

Coarse fragments make up 10 to 35 percent of the A horizon. In the B horizon the content of coarse fragments ranges from 30 to 60 percent; in the C horizon the content is generally more than 60 percent. The fragipan may occur in the lower part of the B horizon and in the C horizon, or it may be entirely within the C horizon. Soils having a lower content of coarse fragments than the Marilla soils but having a higher clay content than 28 percent and containing prominent mottles are identified as the Fremont soils. Hues range between 10YR and 5Y; the more olive colors are confined to the lower solum. Generally, the solum is strongly acid, and the substratum is strongly acid or moderately acid. Soils that are free of mottles above a depth of 20 inches are identified as the Manlius soils. The depth to bedrock ranges from 40 inches to 10 feet.

Middlebury Series

The Middlebury series consists of acid, generally moderately well drained soils that formed in acid alluvium recently washed from areas underlain mainly by sandstone, siltstone, and shale. In some places these soils are somewhat poorly drained. They are in the same drainage

sequence as the poorly drained Holly soils. They are the acid analogs of the Eel soils. The Middlebury soils are darker colored just below the A1 horizon than the Scio soils; they lack the textural B horizon of the Collamer soils; and they lack the rounded pebbles of the Phelps soils. Middlebury soils lie along the larger streams in the southwestern part of the county.

Typical profile of Middlebury silt loam (in a nearly level pastured field, 2 miles northeast of the village of Attica):

A1—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary. Horizon is 4 to 10 inches thick.

C1—8 to 17 inches, brown (10YR 5/3) silt loam; weak, medium, granular structure; friable; few fine roots; strongly acid; clear, smooth boundary. Horizon is 7 to 12 inches thick.

C2—17 to 42 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/6); massive (structureless); friable; few roots; medium acid; clear, smooth boundary. Horizon is 23 to 27 inches thick.

IIC3—42 to 50 inches +, dark grayish-brown (2.5Y 4/2) shaly silt loam; shale occurs in shinglelike layers; common, medium, distinct mottles and stains of strong brown (7.5YR 5/6); massive; slightly firm in place; loose when removed; no roots; slightly acid.

The clay content in the control section ranges from 12 to 18 percent. Less than 15 percent of the sand is coarser than very fine. The colors vary little from those given in the typical profile. In areas where mottles are evident just below the Ap or A1 horizon, the Middlebury soils intergrade to the more poorly drained Holly soils. The reaction is strongly acid or moderately acid. The depth to bedrock ranges from 4 to 10 feet.

Minoa Series

The Minoa series consists of somewhat poorly drained soils that formed in sandy deposits in which the median particle size is near the boundary separating fine sand and very fine sand. These soils have a B horizon that is diffuse or banded. They are in the same drainage sequence as the well drained Arkport soils, the moderately well drained Galen soils, and the poorly drained or very poorly drained Lamson soils. They are lower in silt and clay content than the Niagara soils, and they lack the textural B horizon of those soils. The Minoa soils are finer textured and less acid than the Stafford soils. Minoa soils commonly occur in nearly level areas that receive runoff from other soils. They are most extensive on the flats in the basins of Tonawanda, Oak Orchard, and Black Creeks.

Typical profile of Minoa very fine sandy loam (in a nearly level cultivated field, 1½ miles northeast of the village of Pembroke):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) very fine sandy loam; moderate, fine, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

B1—9 to 20 inches, yellowish-brown (10YR 5/4) very fine sandy loam; common, medium, distinct mottles of brownish yellow (10YR 6/6) and very pale brown (10YR 7/3); weak, fine, subangular blocky structure; friable; few fine roots; slightly acid; clear, wavy boundary. Horizon is 7 to 18 inches thick.

B2—20 to 42 inches, pale-brown (10YR 6/3) very fine sandy loam; many, coarse, distinct mottles of dark grayish brown (2.5Y 4/2) and strong brown (7.5YR 5/4 and 5/6); weak, medium, subangular blocky structure; slightly firm in place, friable when removed; few fine roots; neutral; clear, wavy boundary. Horizon is 14 to 28 inches thick.

C—42 to 60 inches +, light brownish-gray (10YR 6/2) loamy very fine sand; many, medium, distinct mottles of dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6); weak, medium, platy structure; friable (slightly firm in place); no roots; mostly neutral, but weakly calcareous at a depth of 55 inches.

The A horizon is very fine sandy loam in most places, but it is loam or fine sandy loam in small areas. Although the profile is banded in some places, less than 10 percent of the control section contains genetic textural bands. The B horizon may have a chroma of 2 and many distinct mottles. Carbonates are at a depth ranging from 30 to 60 inches. The depth to bedrock ranges from 10 to 40 feet. A lack of distinct mottling at a 12- to 16-inch depth identifies the Galen soils. Chromas of 2 and 1 in the A2g horizon identify the Lamson soils.

Mohawk Series

In the Mohawk series are well drained and moderately well drained soils that formed in medium-textured, highly calcareous glacial till consisting mainly of calcareous, dark-gray, silty shale. These soils are in the same drainage sequence as the moderately well drained or somewhat poorly drained Manheim soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. Mohawk soils are dark colored throughout and have a B horizon in which the structure is dominantly fine blocky. This fine blocky structure is lacking in the Honeoye and Lima soils, which have values and chromas that are higher than 4/3 to 3/2 in the lower part of the solum. The Mohawk soils have a thinner solum and a higher base status than the Lansing soils, and they lack the prominent A2 horizon of those soils. They are not so fine textured as the Darien soils, and they are better drained. Mohawk soils are undulating to hilly and mainly convex. Most of their acreage is west and southwest of Batavia, just south of State Route 33.

Typical profile of Mohawk silt loam (in a cultivated field having a slope of 9 percent, 3 miles west-southwest of the city of Batavia):

Ap—0 to 8 inches, very dark brown (10YR 2/2) shaly silt loam; moderate, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

B2t—8 to 26 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) shaly heavy silt loam; moderate, fine and medium, subangular blocky structure; some discontinuous clay films on ped surfaces; slightly firm; few fine roots; mildly alkaline; clear, wavy boundary. Horizon is 15 to 25 inches thick.

C—26 to 60 inches +, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) very shaly to shaly loam; very weak, thick, platy structure; slightly firm; few fine roots; calcareous.

The A horizon commonly is silt loam. In the B horizon the clay content ranges from 18 to 28 percent. The solum is slightly acid to mildly alkaline. Carbonates occur at a depth of 24 to 40 inches. The content of coarse fragments ranges from 5 to 20 percent in the solum and from 10 to 30 percent in the substratum. Bedrock is mainly black calcareous shale and lies at a depth of 40 inches to 10 feet or more. In some places there are a few faint mottles in the lower part of the B horizon.

Although the Mohawk soils are normally deep, a moderately deep variant having an A horizon of shaly silt loam was mapped in Genesee County.

Niagara Series

The Niagara series consists of somewhat poorly drained soils that formed in silty deposits, mainly lacustrine sedi-

ments or old alluvium. These soils have a dark-colored Ap, or A1, horizon; a light grayish-brown or grayish-brown A2 horizon; and a textural B horizon that is underlain by stratified deposits of calcareous silt and sand. They are in the same drainage sequence as the well drained Dunkirk soils, the moderately well drained Collamer soils, and the poorly drained or very poorly drained Canandaigua soils. The Niagara soils are lacking the fine-textured blocky B horizon of the Rhinebeck soils. They are not so coarse textured as the Stafford and Minoa soils, and they lack the rounded pebbles of the Fredon soils. Niagara soils occur in level or nearly level areas that are widely distributed on the lake plain in the northern half of the county.

Typical profile of Niagara silt loam (in a nearly level hayfield, 1½ miles south of the village of Pembroke):

Ap—0 to 9 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

A2g—9 to 11 inches, grayish-brown (10YR 5/2) silt loam; many, fine and medium, distinct mottles of yellowish brown (10YR 5/6) and dark brown (7.5YR 4/4); very weak, medium, subangular blocky structure; friable; common fine roots; slightly acid; abrupt, irregular boundary. Horizon is 1 to 6 inches thick.

B21—11 to 16 inches, reddish-brown (5YR 4/3) heavy silt loam; common, fine, distinct mottles of strong brown (7.5YR 5/6); distinct interfingering of material from A2g horizon surrounds some peds in upper part; moderate, medium, subangular blocky structure; friable; few fine roots; neutral; clear, smooth boundary. Horizon is 2 to 6 inches thick.

B22t—16 to 22 inches, reddish-brown (5YR 4/3) light silty clay loam; common, medium, distinct mottles of brown and strong brown (7.5YR 4/4 and 5/6), and few, fine, faint mottles of brown (7.5YR 5/2); moderate, medium, subangular blocky and some angular blocky structure within moderate, medium, prismatic structure; some brown (7/5YR 5/2) clay films on ped surfaces; friable when moist, slightly sticky when wet; neutral; clear, smooth boundary. Horizon is 5 to 7 inches thick.

B23t—22 to 26 inches, reddish-brown (5YR 4/3) light silty clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/6) and light olive brown (2.5Y 5/4); moderate, medium, platy structure within moderate, coarse, prismatic structure; some brown (7.5YR 5/2) clay films on faces and in pores; friable when moist, slightly sticky when wet; mildly alkaline; abrupt, smooth boundary. Horizon is 3 to 5 inches thick.

C—26 to 36 inches +, reddish-brown (5YR 5/3) silt loam grading to stratified sand and silt; few, coarse, distinct mottles of brown (7.5YR 4/4); strong, thick, platy structure; firm; calcareous.

The A horizon is dominantly silt loam, but in small areas it is very fine sandy loam. In the B horizon, the texture ranges from silt loam to silty clay loam and the clay content from 18 to 35 percent. The solum is slightly acid to mildly alkaline. Carbonates occur at a depth of 20 to 40 inches. Hues range from 10YR to 5YR. The profile is reddish brown in about half of the acreage and is grayish brown in the rest. Soils in which distinct mottles are lacking between the depths of 12 and 16 inches are identified as the better drained Collamer soils. In areas where the A2g horizon has a chroma of 2 and contains few to common mottles, the soils are identified as the poorly drained Canandaigua soils. The depth to bedrock is 4 to 40 feet or more.

Nunda Series

Soils of the Nunda series are well drained or moderately well drained. They formed in a deposit of ablation morainic or eolian silt underlain by sharply contrasting glacial till of moderately fine texture. The till was strongly influenced by gray, dark-gray, or olive-colored clayey shale or by reworked lake sediments similar to disintegrated shale. The upper part of the Nunda soils formed in silt; the textural B horizon, in glacial till. These soils are in the same drainage sequence as the somewhat poorly drained Burdett soils. The Nunda soils have a B1 horizon that is lacking in the Darien, Cazenovia, Conesus, and Lima soils. In addition, Nunda soils are not so red as the Cazenovia soils, and they are finer textured than the Conesus and Lima soils. They also are finer textured than the Marilla soils. The Nunda soils have a textural B horizon that is lacking in the Fremont and Hornell soils, and they are less acid than those soils. Nunda soils are mainly in convex areas in Pavilion and Bethany Townships.

Typical profile of Nunda silt loam (in a cultivated field having convex slopes of 8 percent, 1½ miles west of Pavilion):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 11 inches thick.

A21—9 to 19 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; common fine roots; slightly acid; clear, smooth boundary. Horizon is 8 to 12 inches thick.

B1—19 to 30 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, faint mottles of gray (10YR 5/1) and distinct mottles of light olive brown (2.5Y 4/4); weak, medium, subangular blocky structure; friable; few fine roots; neutral; abrupt, wavy boundary. Horizon is 2 to 6 inches thick.

IIB21t—30 to 36 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; interfingering of material from B1 horizon surrounds some peds in upper part; gray (5Y 5/1) clay films; common, medium, distinct mottles of light olive brown (2.5Y 5/4); moderate, medium, subangular blocky structure; slightly firm; few fine roots; neutral; clear, wavy boundary. Horizon is 3 to 8 inches thick.

IIB22t—36 to 45 inches, gray (5Y 5/1) silty clay loam; olive-gray (5Y 5/2) clay films on ped surfaces; common, fine, distinct mottles of light olive brown (2.5Y 5/4); moderate, medium, angular blocky structure within moderate, medium, prismatic structure; slightly firm; no roots; mildly alkaline, but weakly calcareous in lower part; gradual, smooth boundary. Horizon is 7 to 11 inches thick.

IIC—45 to 55 inches +, gray (N 5/0) to light-gray (5Y 6/1) shaly silty clay loam streaked with common, medium, distinct mottles of olive (5Y 5/3) and very dark grayish brown (2.5Y 3/2); weak, thick, platy structure, but moderate, coarse, prismatic structure extending into upper part; firm; calcareous.

The A horizon generally is silt loam, but in small areas it is loam. The B1 horizon is loam or silt loam. Clay makes up 28 to 35 percent of the IIB2t horizon. Hues range from 10YR to 5Y. A chroma of 4 or 3 is common in the B1 horizon, and chromas of 4 and 2 are common in the B2t horizon. The thickness of the contrasting surface mantle ranges from 18 to 40 inches. Mottling above a 15-inch depth distinguishes the Burdett soils. From 0 to 10 percent of the A and B1 horizons consists of coarse fragments. These are mostly cobblestones and shale fragments. Coarse fragments, mainly shale, make up 5 to 20 percent of the IIB and IIC horizons. The depth to calcareous material ranges from 30 to 55 inches. The depth to shale bedrock is generally 3½ to 10 feet, but locally it is as much as 40 feet.

Odessa Series

The Odessa series consists of somewhat poorly drained soils that formed in reddish, calcareous, glaciolacustrine

clay and silt. In cultivated areas these soils have a very dark grayish-brown Ap horizon; a thin, lighter colored A2 horizon; and a fine-textured, blocky B horizon in which there is good evidence of clay flow. The Odessa soils are in the same drainage sequence as the well drained or moderately well drained Schoharie soils, the poorly drained Lakemont soils, and the very poorly drained Fonda soils. In contrast to the Odessa soils, the Rhinebeck and Remsen soils formed in gray materials, and the Ovid soils contain coarse fragments in the solum and have a substratum consisting of firm till. The Odessa soils occupy nearly level or gently sloping areas that receive some runoff from adjacent areas. Most of their acreage is just north of the Onondaga limestone escarpment, mainly in the basins of Black Creek and lower Tonawanda Creek.

Typical profile of Odessa silt loam (in a nearly level cultivated field, one-fourth mile east of Horseshoe Lake):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

A2g—10 to 13 inches, light brownish-gray (10YR 6/2) heavy silt loam; many, medium, distinct mottles of gray (10YR 5/1) and strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; slightly firm; few fine roots; neutral; abrupt, wavy boundary. Horizon is 0 to 7 inches thick.

B21t—13 to 21 inches, reddish-brown (5YR 4/3) silty clay; interfingering of material from A2g horizon surrounding some peds in upper part; common, fine, distinct mottles of brown (7.5YR 4/4 and 5/2); moderate, medium, angular blocky structure within moderate, medium, prismatic structure; firm when moist, sticky when wet; few fine roots; mildly alkaline; clear, smooth boundary. Horizon is 4 to 11 inches thick.

B22t—21 to 31 inches, reddish-brown (5YR 4/3) clay; common, medium, faint mottles of reddish brown (5YR 4/4) and reddish gray (5YR 5/2); distinct, weak, red (2.5YR 5/2) clay films in lower part and extending into pore spaces in upper C horizon; strong, medium, angular blocky structure within moderate, coarse to very coarse, prismatic structure; firm when moist, sticky when wet; mildly alkaline; no roots; clear, wavy boundary. Horizon is 8 to 13 inches thick.

C—31 to 40 inches +, reddish-brown (5YR 5/3) silty clay loam; common, medium, faint mottles of brown (7.5YR 4/4); moderate, medium and thick, platy structure; slightly firm; strongly calcareous.

The texture of the Ap horizon ranges from silt loam to silty clay loam. In the B horizon, the texture is commonly silty clay or clay and the clay content is 35 to 60 percent. Hues range from 7.5YR to 2.5YR. Soils in which the dominant hues are 10YR or yellower are identified as Remsen or Rhinebeck soils. In most places the solum is nearly neutral and carbonates are at a depth of 20 to 40 inches. Commonly, stratified silt and very fine sand underlie the solum. The Odessa soils intergrade to the Schoharie soils in places where distinct mottles are lacking at a depth of 12 to 16 inches. The A2g horizon has a chroma of 1 in areas near the Lakemont soils. The depth to bedrock ranges from 15 to 50 feet.

Ontario Series

The Ontario series is made up of well-drained soils that formed in medium-textured, calcareous glacial till consisting of limestone, sandstone, and shale. The limestone is mainly dolomitic, and the sandstone and shale are reddish brown or pinkish gray. These soils have a prominent A2 horizon and a degrading textural B horizon that contain illuvial clay. They are in the same drainage sequence as the moderately well drained Hilton soils, the somewhat poorly drained Appleton soils, the poorly drained Lyons soils, and the very poorly drained Alden soils. The Ontario soils have A2 and textural B horizons that are similar to those of the Lansing soils, but they are less grayish than Lansing soils. Ontario soils generally are not so fine textured as the Cazenovia soils. The Ontario soils occur in gently sloping to moderately steep, distinctly convex areas across the northern half of the county.

Typical profile of Ontario loam (in a cultivated field having a slope of 4 percent, 2½ miles north of Elba):

Ap—0 to 10 inches, dark-brown (7.5YR 3/2) loam (10 percent gravel); weak, fine and medium, granular structure; very friable; many fine roots; moderately acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2—10 to 16 inches, brown (7.5YR 5/2 to 5/4) very fine sandy loam to loam; weak, medium, platy structure; friable; few fine roots; moderately acid; abrupt, irregular boundary. Horizon is 1 to 11 inches thick.

B1—16 to 25 inches, brown (7.5YR 4/4) to reddish brown (5YR 4/4) heavy loam; small pockets of brown (7.5YR 5/2) material, same as that in A2 horizon; weak, medium, subangular blocky structure; friable to slightly firm; slightly acid; clear, wavy boundary. Horizon is 5 to 13 inches thick.

B2t—25 to 35 inches, reddish-brown (5YR 4/4 or 4/3) light clay loam; moderate, medium, subangular blocky structure; dark reddish-brown (5YR 3/3) clay film on ped faces and in pores; slightly firm; neutral; clear, wavy boundary. Horizon is 8 to 17 inches thick.

C—35 to 45 inches +, pinkish-gray (5YR 6/2) to brown (7.5YR 5/2) gravelly loam; moderate, thin and medium, platy structure; firm; calcareous.

The Ap horizon is loam or stony loam. From 18 to 28 percent of the B2t horizon is clay. The A2 horizon varies widely in thickness within the same field. Commonly, it is thinnest on ridgetops and thickest on the lower slopes. The depth to carbonates ranges from 30 to 42 inches, and the zone of maximum clay accumulation is 4 to 10 inches above that depth. The solum is moderately acid or slightly acid in the A horison and is slightly acid to mildly alkaline in the B horizon. Rounded gravel makes up less than 5 to about 20 percent of the A horizon; coarse fragments make up 10 to 25 percent of the B and C horizons. The depth to bedrock ranges from 4 to 50 feet.

Ovid Series

The Ovid series consists of moderately well drained or somewhat poorly drained soils that formed in moderately fine textured, reddish, calcareous glacial till. In some places the till is mixed with reddish lacustrine silty clay, and in others it has a high content of red shale. These soils have a textural B horizon in which the structure is blocky and there are clay films on ped surfaces. They are in the same drainage sequence as the well drained or moderately well drained Cazenovia soils, the poorly drained Romulus soils, and the very poorly drained Alden soils. The Ovid soils are finer textured than the Appleton and Kendaia soils. They formed in reddish materials, whereas the Darien soils formed in grayish materials. Unlike the Ovid soils, the Odessa soils lack coarse fragments in the solum and have a substratum of firm till. The Ovid soils occupy level to gently sloping areas that occur across the northern half of the county.

Typical profile of Ovid silt loam (in a cultivated field having a slope of 3 percent, 3½ miles southwest of the village of Byron):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; slightly acid; many fine roots; pH 6.6; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

A2g—10 to 12 inches, pinkish-gray (7.5YR 6/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6); very weak, medium, platy structure; friable; few fine roots; slightly acid; clear, wavy boundary. Horizon is 1 to 6 inches thick.

B21t—12 to 19 inches, reddish-brown (5YR 4/3) light silty clay loam; interfingering of material from A2g horizon surrounds some peds in upper part; many, medium, distinct mottles of strong brown (7.5YR 5/6); some reddish-gray (5YR 5/2) clay films in pores; moderate, fine and medium, subangular blocky structure; slightly firm when moist, sticky when wet; few fine roots; neutral; clear, wavy boundary. Horizon is 5 to 10 inches thick.

B22t—19 to 29 inches, reddish-brown (5YR 4/3) silty clay loam; some isolated pockets of silty clay; many, fine and medium, distinct mottles of yellowish brown (10YR 5/4-5/6); dark reddish-gray (5YR 4/2) clay films on ped surfaces; moderate, medium and coarse, subangular blocky structure; firm when moist, sticky when wet; no roots; neutral; gradual, smooth boundary. Horizon is 8 to 12 inches thick.

C—29 to 40 inches +, reddish-brown (5YR 5/3) gravelly silty clay loam; common, fine, faint mottles of brown (7.5YR 4/4); moderate, thick, platy structure; calcareous.

In Genesee County the Ap horizon is only silt loam. The clay content in the B2t horizon ranges from 28 to 35 percent. Hues of 7.5YR or redder are dominant in the profile. Just below the Ap horizon, the chroma is 2 and mottles are common and distinct. Soils in which the B horizon is faintly mottled and the A2 horizon contains faint mottles or a few distinct mottles are identified as the Cazenovia soils. In areas where the color of the Ap horizon is 10YR 3/1 or 2/2 and more than 60 percent of the soil mass has a chroma of 2 or less, the soils are identified as the poorly drained Romulus soils. The solum of the Ovid soils is slightly acid or neutral throughout. Carbonates are at a depth ranging from 24 to 40 inches. The depth to bedrock ranges from 6 to 40 feet.

Palmyra Series

The Palmyra series consists of gravelly, well-drained soils that formed in calcareous glacial outwash derived from limestone, sandstone, and shale. These soils generally have a dark grayish-brown or very dark grayish-brown Ap, or A1, horizon; a lighter colored A2 horizon that is highly leached; and a B horizon that contains illuvial clay. The B horizon is paler in color than either the A or the C horizon, and the C horizon generally includes tongues of material from the B horizon. Palmyra soils are in the same drainage sequence as the moderately well drained Phelps soils, the somewhat poorly drained Fredon soils, and the poorly drained or very poorly drained Halsey soils. The textural B horizon of the Palmyra soils is lacking in the Chenango soils, which have a color B horizon. The round pebbles that occur in the Palmyra soils are missing in the Dunkirk and Arkport soils. Palmyra soils lie on outwash terraces in the major valleys and on kame terraces that are scattered in other parts of the county.

Typical profile of Palmyra gravelly loam (in a nearly level cultivated field, about 2 miles south of Batavia):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) gravelly loam; moderate, medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary. Horizon is 5 to 11 inches thick.

A2—9 to 12 inches, pale-brown (10YR 6/3) gravelly loam; weak, fine, granular structure and some platy structure; friable; common fine roots; slightly acid; clear, irregular boundary. Horizon is 0 to 7 inches thick.

B21—12 to 17 inches, brown (7.5YR 4/4) gravelly heavy loam; interfingering of material from A2 horizon surrounds a few peds in upper part; moderate, fine and medium, subangular blocky structure; slightly firm; common fine roots; neutral; clear, wavy boundary. Horizon is 3 to 7 inches thick.

B22t—17 to 29 inches, brown (10YR 5/3) gravelly light clay loam; moderate, medium, subangular blocky structure; some dark-brown (10YR 3/3) clay films on ped faces; slightly firm when moist, slightly sticky when wet; few fine roots; mildly alkaline; clear, irregular boundary that extends into the C horizon as tapering tongues. Horizon is 9 to 17 inches thick.

C1—29 to 40 inches, grayish-brown (10YR 5/2) very gravelly sandy loam; very weak structure; loose; calcareous; abrupt, wavy boundary. Horizon is 9 to 13 inches thick.

C2—40 inches +, grayish-brown (10YR 5/2), stratified fine sand, medium sand, and gravel; calcareous.

The Ap horizon generally ranges from gravelly fine sandy loam to shaly silt loam, but in small areas it is loam or fine sandy loam that is almost free of gravel. The color of the Ap horizon normally is dark brown to dark grayish brown. In the B22t horizon the clay content ranges from 18 to 35 percent. Hues are 7.5YR to 10YR in most places. Locally, the A2 horizon extends to a depth of 18 inches. In the tongues of material from the B2 horizon that extend deeply into the C horizon, there are extensions of A2 material, shaped like inverted cones, inside the upper part of the tongues. The gravel in the C horizon is of mixed mineralogy that varies from one place to another. In some places the pebbles are almost entirely limestone but include small amounts of sandstone and shale. In others they are mostly flatter pieces of calcareous shale, together with lesser amounts of rounded limestone and sandstone. The pH ranges from 6.0 to 7.3 in the A horizon and from 6.5 to 7.5 in the lower part of the B horizon. Soils that are mottled at a depth of less than 20 inches are identified as the moderately well drained Phelps soils. The depth to bedrock ranges from 10 to 100 feet.

Phelps Series

In the Phelps series are moderately well drained soils that formed in calcareous glacial outwash from limestone, sandstone, and shale. These soils generally have a very dark grayish-brown Ap horizon; a lighter colored A2 horizon that may contain a few faint mottles; and a B2t horizon that is finer textured than the A horizon, shows evidence of clay films, and normally contains a few faint or distinct mottles. Making up the C horizon are sand and gravel of various sizes that are well stratified to poorly stratified. The Phelps soils are in the same drainage sequence as the well-drained Palmyra soils, the somewhat poorly drained Fredon soils, and the poorly drained or very poorly drained Halsey soils. The rounded pebbles that occur in the Phelps soils are lacking in the Galen and Collamer soils. Phelps soils formed in glacial outwash, whereas the Lima, Hilton, and Conesus soils formed in firm glacial till. In contrast to the Phelps soils, the Scio soils are acid and have a color B horizon that is free of gravel. The Phelps soils are mostly along the major terraces of the county, but they also occur in other places where gravel lies over contrasting materials.

Typical profile of Phelps gravelly loam (in a nearly level cultivated field, 1 mile south of the city of Batavia):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) gravelly loam; moderate, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2—9 to 10 inches, brown (10YR 5/3) gravelly loam; few, fine, faint mottles of yellowish brown (10YR 5/4); moderate, medium, platy structure; friable; common fine roots; neutral; abrupt, irregular boundary. Horizon is 1 to 7 inches thick.

B2t—10 to 21 inches, brown (10YR 4/3) gravelly light clay loam; interfingering of material from A2 horizon surrounds some peds in upper part; few, fine, distinct mottles of yellowish brown (10YR 5/4–5/6) in upper part; common clay films in lower part; moderate, medium, subangular blocky structure; friable to slightly firm; few fine roots; neutral; clear, wavy boundary. Horizon is 9 to 13 inches thick.

B3—21 to 30 inches, dark-brown (10YR 3/3) to very dark grayish-brown (10YR 3/2) gravelly heavy loam having weak, coarse, subangular blocky structure, and irregular pockets of dark yellowish-brown (10YR 4/4) to brown (10YR 4/3) gravelly sandy loam having very weak, thick, platy structure; friable when moist, sticky when wet; few fine roots; mildly alkaline; clear, wavy boundary. Horizon is 7 to 13 inches thick.

IIC—30 to 45 inches +, grayish-brown (10YR 5/2) salt- and pepper-colored, medium sand and fine gravel; single grain; loose; weakly calcareous.

The Ap horizon generally is gravelly loam in which the gravel content ranges to 35 percent, but locally it is fine sandy loam to silt loam that is gravel free. The profile normally is lighter colored in the more sandy areas than it is in the shaly, more silty areas. Its color ranges from pale brown to grayish brown in the A2 horizon and from strong brown to dark brown in the B horizon. The clay content in the B2t horizon is 18 to 35 percent. Mottling may be distinct in the A2 horizon if there is little or no mottling in the B horizon. Generally, the B2 horizon is no finer textured than clay loam. The reaction in the Ap horizon is pH 6.0 to 7.0, and in the B horizon it is pH 6.3 to 7.5. The depth to carbonates ranges from 20 to 40 inches. In some places the profile shows contrasting layers of silt. The thickness of gravel and sand over contrasting glacial till ranges from 40 inches to many feet. Soils that lack mottles within 20 inches of the surface are identified as the well-drained Palmyra soils. Soils that are distinctly mottled at a 12- to 16-inch depth are identified as the somewhat poorly drained Fredon soils. The depth to bedrock ranges from 8 to 30 feet.

Remsen Series

In the Remsen series are medium-lime, somewhat poorly drained soils that formed in fine-textured, grayish, calcareous glacial till consisting largely of soft, gray, clayey shale. The few coarse fragments in the profile are resistant black shale or glacial erratics. These soils are in the same drainage sequence as the poorly drained Madalin soils and the very poorly drained Fonda soils. The Remsen soils resemble the Rhinebeck soils in some respects, but they contain coarse fragments and formed in glacial till instead of lacustrine sediments. They are finer textured and generally somewhat lighter in color than the Darien soils. Remsen soils are less acid than the Hornell soils, and they have a textural B horizon that is lacking in those soils. In contrast to the Remsen soils, the Schoharie soils formed in materials having hues of 7.5YR or redder. The Remsen soils occupy nearly level, slightly convex areas, as well as undulating to steep areas. Most of their acreage is in Bethany, Alexander, and Darien Townships.

Typical profile of Remsen silt loam (in a hayfield having a slope of 4 percent, 2 miles north of the hamlet of Bethany Center):

Ap—0 to 7 inches, very dark grayish-brown (2.5Y 3/2) silt loam; weak, medium, granular structure; friable; many firm roots; slightly acid; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

A2—7 to 9 inches, light olive-brown (2.5Y 5/4) heavy silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and olive gray (5Y 5/2); weak, fine, subangular blocky structure; friable; common fine roots; slightly acid; distinct interfingering of A2 material into the B horizon; clear, smooth boundary. Horizon is 0 to 3 inches thick.

B2t—9 to 27 inches, gray (N 5/0) clay interiors that are streaked with many, medium, prominent mottles of strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6); gray (5Y 5/1) clay films on ped surfaces that show many, medium, prominent mottles of yellowish brown (10YR 5/6); moderate, coarse, angular blocky structure within strong, medium and coarse, prismatic structure; firm when moist, plastic when wet; few fine roots; neutral; clear, wavy boundary. Horizon is 6 to 27 inches thick.

B3—27 to 35 inches, gray (N 5/0) clay; ped films and centers with many, medium, prominent mottles of olive (5Y 5.6); weak, coarse, angular blocky structure within strong, coarse to very coarse, prismatic structure; firm when moist, plastic when wet; no roots; calcareous; clear, wavy boundary. Horizon is 6 to 10 inches thick.

C—35 to 45 inches +, gray (5Y 5/1) clay; many, distinct, olive (5Y 5/6 and 4/3) mottles; moderate, medium and thick, platy structure; firm; calcareous.

The Ap horizon ranges from silt loam to silty clay loam. Hues range from 10YR to 5Y. The low chromas in the B and C horizons are not the result of wetness; they are inherited from the clay shale. The clay content in the B horizon is 35 to 60 percent. Remsen soils are slightly acid or neutral in the A horizon and contain carbonates at a depth of 24 to 48 inches. Shale occurs at a depth ranging from 3 to 15 feet. The shale is unweathered but generally is soft.

Rhinebeck Series

The Rhinebeck series consists of somewhat poorly drained soils that formed in lacustrine deposits of calcareous silt and clay. Commonly, the substratum is stratified with layers of silt and very fine sand. These soils have a well-expressed textural B horizon that is distinctly mottled. They are in the same drainage sequence as the poorly drained Madalin soils and the very poorly drained Fonda soils. Rhinebeck soils resemble the Remsen soils in some respects, but they are browner, lack strong prismatic structure, and do not contain a large amount of fine shale fragments. The B horizon of the Rhinebeck soils has hues of 10YR or yellower, whereas that of the Odessa soils has hues of 7.5YR or redder. Rhinebeck soils are finer textured than the Niagara soils. In contrast to the Rhinebeck soils, the Darien soils have a more compact, less blocky, darker colored B horizon that contains shale fragments. The Rhinebeck soils occupy level or nearly level areas that surround depressional areas in the basins of Tonawanda and Oak Orchard Creeks.

Typical profile of Rhinebeck silt loam (in a nearly level cultivated field, 3 miles south-southeast of the city of Batavia):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

A2g—9 to 12 inches, grayish-brown (10YR 5/2) silt loam; many, medium, disinct mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable to slightly firm; common fine roots; neutral; clear, wavy boundary. Horizon is 2 to 6 inches thick.

B21—12 to 17 inches, dark grayish-brown (10YR 4/2) silty clay loam; many, medium, distinct mottles of gray (10YR 5/1) and yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; firm when moist, plastic when wet; few fine roots; neutral; clear, smooth boundary. Horizon is 3 to 7 inches thick.

B22t—17 to 30 inches, dark grayish-brown (10YR 4/2) silty clay interiors, with common, medium, distinct mottles of yellowish brown (10YR 5/4); dark grayish-brown (2.5Y 4/2) ped exteriors; moderate, medium, angular blocky structure; few dark-gray (10YR 4/1) clay films on ped surfaces; firm when moist, very plastic and sticky when wet; mildly alkaline; no roots; clear, smooth boundary. Horizon is 10 to 16 inches thick.

C1—30 to 42 inches, gray to dark-gray (10YR 5/1–4/1) silty clay loam; common, fine, distinct mottles of brown (10YR 4/3); moderate, coarse plates within very weak coarse prisms; firm; calcareous; clear, smooth boundary. Horizon is 9 to 15 inches thick.

IIC2—42 to 50 inches +, gray (10YR 5/1) varved clay, silt, and very fine sand; calcareous.

In this county the texture of the A horizon is loam. The B horizon ranges from silty clay loam to clay and has a clay content of 35 to 55 percent. In areas where the B horizon is only 35 percent clay, the Rhinebeck soils intergrade to the Niagara soils. The C horizon generally is silt loam or silty clay loam, but it may include layers of coarse silt or very fine sand. The distinctly mottled A2g horizon, together with faint or distinct mottling in the B horizon, indicates that the Rhinebeck soils are somewhat poorly drained. The solum is slightly acid to mildly alkaline. Carbonates are at a depth ranging from 24 to 36 inches. The depth to bedrock is 10 to 40 feet.

Romulus Series

In the Romulus series are poorly drained soils that formed in moderately fine textured, calcareous glacial till consisting generally of limestone and reddish shale. In some places the till is mixed with reddish lacustrine sediments. These soils have a very dark gray to black Ap horizon and a reddish-brown Bt horizon that contains many distinct mottles. They are in the same drainage sequence as the well drained or moderately well drained Cazenovia soils, the somewhat poorly drained Ovid soils, and the very poorly drained Alden soils. Romulus soils are similar in texture to the Ilion soils, which formed in gray materials. They are not so fine textured as the Lakemont soils, and they contain more shale fragments than those soils, but they are finer textured than the Lyons soils. The Romulus soils occur in level or slightly depressional areas, mainly north of the Onondaga limestone escarpment.

Typical profile of Romulus silt loam (in a nearly level cultivated field, 2 miles southwest of Oakfield):

Ap—0 to 9 inches, very dark gray to black (10YR 3/2–2/1) silt loam; moderate, medium, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary. Horizon is 8 to 10 inches thick.

A2g—9 to 12 inches, gray (10YR 5/1) silt loam; common, medium, distinct mottles of brown (7.5YR 4/4); weak, medium, platy structure; friable; neutral; abrupt, irregular boundary. Horizon is 2 to 5 inches thick. Thin tongues (¼ to ½ inch wide) of material from this horizon extend into B horizon.

B21g—12 to 16 inches, dark-brown (7.5YR 4/2) silty clay loam interiors, with many, medium, faint mottles of brown (7.5YR 4/4) and distinct mottles of strong brown (7.5YR 5/6); peds coated with dark gray (10 YR 4/1); weak, medium, subangular blocky structure; slightly firm; neutral; clear, wavy boundary. Horizon is 3 to 7 inches thick.

B22tg—16 to 26 inches, reddish-brown (5YR 4/3) silty clay loam (10 percent stones); many, medium, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); numerous brown (7.5YR 5/2) clay films in pores; moderate, medium, subangular blocky structure and some angular blocky structure within weak, medium, prismatic structure; slightly firm to firm when moist, very sticky when wet; mildly alkaline; clear, wavy boundary. Horizon is 8 to 13 inches thick.

C—26 to 36 inches +, reddish-brown (5YR 5/3) gravelly silty clay loam till; common, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure within weak, coarse, platy structure; firm when moist, sticky when wet; calcareous.

The texture of the A horizon is silt loam or loam. The B horizon is mainly silty clay loam and has a clay content ranging from 28 to 35 percent. Hues throughout the profile are dominantly 7.5YR or redder. Carbonates are at a depth of 20 to 40 inches. A few coarse fragments are present; these are mostly cobblestones of limestone. A chroma of 2 and many mottles in the A2g horizon distinguish the somewhat poorly drained Ovid soils. The depth to bedrock ranges from 7 to 20 feet.

Schoharie Series

The Schoharie series consists of well drained and moderately well drained soils that formed in lacustrine deposits of calcareous silt and clay. These soils have dominant hues of 7.5YR or redder. They may be mottle free throughout, but commonly they are faintly mottled in the A2 horizon. The B horizon generally is silty clay or clay that has strong blocky structure. In most places the C horizon is made up of stratified clay, silt, and very fine sand. Schoharie soils are in the same drainage sequence as the somewhat poorly drained Odessa soils, the poorly drained Lakemont soils, and the very poorly drained Fonda soils. The Schoharie soils are finer textured than the Dunkirk soils. They formed in reddish materials, whereas the Rhinebeck soils formed in grayish materials. In contrast to Schoharie soils, the Remsen soils have yellower hues and, in their lower solum, consist dominantly of shale fragments. The Schoharie soils occupy undulating to hilly or steep convex slopes. Most of their acreage is in the Horseshoe Lake area.

Typical profile of Schoharie silt loam (in a cultivated field having a slope of 3 percent, one-half mile east of Horseshoe Lake):

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) silt loam; moderate, medium, granular structure; friable; common fine roots; neutral; abrupt, smooth boundary. Horizon is 5 to 10 inches thick.

A2—8 to 11 inches, pale-brown (10YR 6/3) silt loam; few, fine, faint mottles of brown (7.5YR 5/4); weak, thin, platy structure; friable; few fine roots; slightly acid; abrupt, wavy boundary. Horizon is 0 to 5 inches thick. Thin tongues of material from this horizon extend about 6 inches into the B21 horizon.

B21—11 to 18 inches, reddish-brown (5YR 5/4) silty clay; moderate to strong, fine, angular blocky structure within moderate, medium, prismatic structure; material from A2 horizon on some prism faces; firm when moist, plastic when wet; few fine roots; neutral; clear, wavy boundary. Horizon is 3 to 10 inches thick.

B22t—18 to 33 inches, reddish-brown (2.5YR 4/4) clay; strong, medium, angular blocky structure within moderate, coarse, prismatic structure; some clay film on vertical faces; firm when moist, very plastic when wet; few fine roots in upper part; mildly alkaline; clear, smooth boundary. Horizon is 12 to 18 inches thick.

C1—33 to 44 inches, reddish-brown (5YR 5/3) silty clay and layers of fine silt; moderate coarse plates within weak very coarse prisms; very firm; calcareous; gradual, smooth boundary. Horizon is 8 to 14 inches thick.

IIC2—44 to 57 inches, reddish-brown (5YR 4/3), laminated silt and very fine sand; single grain; slightly firm; calcareous.

The A horizon is silt loam or silty clay loam. The deposits generally are stratified to some extent, and the texture of the strata is reflected in bands within the solum. The texture ranges from heavy silt loam to clay. In the B horizon, layers finer textured than silty clay loam are dominant and the clay content ranges from 35 to 60 percent. In some places there are a few distinct mottles in the A2 horizon. Soils that contain common to many distinct mottles in the A2 horizon and a few distinct mottles in the B horizon are identified as Odessa soils. The solum of Schoharie soils is slightly acid to mildly alkaline. The depth to carbonates ranges from 24 to 60 inches. Bedrock is at a depth of 10 to 60 feet.

Scio Series

The Scio series consists of moderately well drained soils that formed in alluvial, lacustrine, or eolian deposits of coarse silt. In Genesee County these soils are not in a drainage sequence with other soils, but they occur with the more poorly drained Niagara and Canandaigua soils. The Scio soils have a color B horizon, whereas the Collamer soils have a B horizon containing illuvial clay. They are finer textured than the Elnora soils. The Scio soils are similar in drainage to the Galen soils, but they lack the banded textural B horizon of those soils. Although their solum overlies contrasting deposits of gravel in some places, the Scio soils lack the coarse fragments that are typical of the Chenango soils. Scio soils lie mainly on side terraces and on the lake plain in the lower basin of Tonawanda Creek.

Typical profile of Scio silt loam (in a hayfield having a slope of 3 percent, 2 miles southwest of the hamlet of Basom):

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; many fine roots; moderately acid; abrupt, smooth boundary. Horizon is 7 to 10 inches thick.

B21—9 to 17 inches, yellowish-brown (10YR 5/4) coarse silt loam; very weak, medium, subangular blocky structure; very friable; few fine roots; moderately acid; clear, wavy boundary. Horizon is 6 to 10 inches thick.

B22—17 to 21 inches, pale-brown (10YR 6/3) coarse silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and grayish brown (10YR 5/2); very weak, medium, subangular blocky structure; friable; few fine roots; moderately acid; clear, smooth boundary. Horizon is 3 to 5 inches thick.

C1—21 to 32 inches, grayish-brown (10YR 5/2) coarse silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/4); very weak, medium, platy structure; slightly firm to firm in place, friable when removed; moderately acid; no roots; clear, wavy boundary. Horizon is 8 to 14 inches thick.

IIC2 32 to 40 inches +, brown (7.5YR 4/4) silt loam containing a few erratic pebbles; weak, thick, platy structure; firm; slightly acid.

In texture the A and B horizons range from silt loam, which is as much as 80 percent silt, to very fine sandy loam, which is as little as 30 percent silt but is at least 20 percent very fine sand and not more than 15 percent sand coarser than very fine. Generally, clay makes up less than 18 percent of the B horizon. At the coarse end of the textural range, the Scio soils intergrade to the Elnora or the Galen soils. The color of the B horizon ranges from brown (10YR 5/3) to yellowish brown (10YR 5/6). The solum is strongly acid to slightly acid. The depth to a contrasting substratum of gravel, glacial till, or lacustrine clay ranges from 40 inches to 6 feet or more. Distinct mottles at a 12- to 16-inch depth, together with stronger structure, distinguish the somewhat poorly drained Niagara soils. The depth to bedrock is 10 to 30 feet.

Sloan Series

The Sloan series consists of very poorly drained soils that formed in medium-textured and moderately fine textured alluvium recently washed from areas of calcareous glacial drift. These soils have a thick, dark-colored A horizon and dark-gray subsurface horizons. They are in the same drainage sequence as the poorly drained Wayland soils, the moderately well drained Eel soils, and the well drained Genesee soils. The Sloan soils lack the high color values below the A1 horizon that commonly occur in the Lamson, Canandaigua, and Madalin soils. In addition, they are finer textured than the Lamson soils but are not so fine textured as the Madalin soils. Sloan soils lack the coarse fragments that occur in the Lyons and Halsey soils. The Sloan soils lie mainly in oxbows and other low areas away from the main streams in the major valleys.

Typical profile of Sloan silt loam (in a depressional oxbow area used for pasture, 3 miles south of the city of Batavia):

A1—0 to 12 inches, very dark gray (10YR 3/1) silt loam; many, fine, distinct mottles of dark yellowish brown (10YR 3/4); moderate, medium, granular structure; friable; common roots in upper part; neutral; gradual, smooth boundary. Horizon is 10 to 13 inches thick.

C1g—12 to 25 inches, dark-gray (5Y 4/1 and 10YR 4/1) crushed silt loam; common, fine, distinct mottles of dark yellowish brown (10YR 3/4), and olive-gray (5Y 4/2) areas surrounding mottles; moderate, medium, granular structure within moderate, fine, subangular blocky structure; numerous worm casts and channels; mildly alkaline; gradual, smooth boundary. Horizon is 10 to 16 inches thick.

C2g—25 to 40 inches +, dark-gray (N 4/0) light silty clay loam; weak, coarse, prismatic structure; slightly firm; weakly calcareous.

The texture generally ranges from silt loam to light silty clay loam throughout, but in places there are sandy layers in which more than 15 percent of the sand is coarser than very fine. In some areas the surface is covered with a layer of organic material less than 1 inch thick. The profile is neutral throughout in some places, but in others it is neutral in the upper part and calcareous below. Soils that lack distinct mottles in the A1 horizon and in the upper part of the C horizon are identified as the poorly drained Wayland soils. The depth to bedrock ranges from 10 to 40 feet.

Stafford Series

The Stafford series consists of somewhat poorly drained, coarse-textured soils that formed in sandy lacustrine or eolian deposits. These soils are in the same drainage sequence as the excessively drained to well drained Colonie soils and the moderately well drained Elnora soils. However, the Colonie soils are unmottled, and the Elnora soils are mottled only in the lower part of the B horizon. The Stafford soils are coarser textured than the Fredon and Minoa soils. They lack the coarse fragments of the Fredon soils and the sticky, more clayey bands of the Minoa soils. Stafford soils do not have the blocky textural B horizon of the Niagara soils, which formed in more silty deposits. The Stafford soils occupy only a few areas in the county, mainly in the lower basins of Tonawanda and Black Creeks.

Typical profile of Stafford loamy fine sand (in a nearly level hayfield, 1 mile south of the village of Pembroke):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine and medium, granular structure; very friable; strongly acid; abrupt, smooth boundary. Horizon is 6 to 10 inches thick.

B21—8 to 18 inches, brown (10YR 5/3) loamy fine sand; common, coarse, distinct mottles of strong brown (7.5YR 5/6), and medium mottles of light brownish gray (10YR 6/2); weak, thick, platy structure; friable, but slightly firm in local spots; strongly acid; clear, wavy boundary. Horizon is 8 to 13 inches thick.

B22—18 to 30 inches, grayish-brown (10YR 5/2) loamy fine sand; common to many, coarse, distinct mottles of strong brown (7.5YR 5/6), and yellowish-red (5YR 4/6) iron stains; massive; firm in place, friable when crushed; strongly acid; clear, wavy boundary. Horizon is 8 to 15 inches thick.

C—30 to 36 inches +, light-gray (10YR 6/1) fine sand; resembles mixed salt and pepper; common, medium, prominent mottles of brown (7.5Y 4/4) and strong brown (7.5YR 5/6); firm in place, friable when removed; moderately acid.

In Genesee County the A horizon was mapped only as loamy fine sand. The pH of the solum generally ranges between 5.0 and 6.0, but the C horizon may be mildly alkaline below a depth of 30 inches. In some places there are small, rust-brown iron concretions in the profile. In places these soils are very firm in the lower part of the B horizon and in the C horizon, but they lack the compact prisms and the bleached areas between the prisms that characterize a fragipan. A lack of distinct mottles at a 12- to 16-inch depth identifies the moderately well drained Elnora soils, and finer textured soils that have a chroma of 1 in the A2g horizon are identified as the poorly drained Lamson soils. The depth of Stafford soils to bedrock ranges from 4 to 30 feet.

Warners Series

The Warners series consists of poorly drained and very poorly drained soils in which a thin layer of black muck mixed with mineral material is underlain by gray marl. The surface horizon of these soils is thinner and not so dark colored as that of the Edwards soils. Unlike the Warners soils, the Canandaigua and Lamson soils are mineral material throughout. The Warners soils occupy depressional swampy areas in the northern part of the county.

Typical profile of Warners loam (in a depressional swampy area, 1 mile west of the village of Bergen):

O2—2 to 0 inches, black (10YR 2/1) granular muck; very friable; mildly alkaline; abrupt, wavy boundary. Horizon is 0 to 4 inches thick.

A1—0 to 6 inches, very dark gray (10YR 3/1) loam, high in organic-matter content; moderate, fine, granular structure; very friable, calcareous; gradual, smooth boundary. Horizon is 3 to 10 inches thick.

IIC—6 to 42 inches +, white (10YR 8/1) marl that contains numerous small shell fragments; moderate granular structure; very friable; strongly calcareous.

In some places the O2 horizon is missing. In other places, where the Warners soils intergrade to the Edwards soils, the mineral surface is covered with muck as much as 12 inches thick. The depth to bedrock ranges from 10 to 40 feet.

Wayland Series

The Wayland series consists of poorly drained soils that formed in medium-textured alluvium recently deposited on first bottoms along the main streams. Each spring these soils are flooded and receive fresh silty material that washed from the adjacent high-lime uplands. Wayland soils are in the same drainage sequence as the well drained Genesee soils, the moderately well drained Eel soils, and the very poorly drained Sloan soils. The Wayland soils have a high base status that is lacking in the Holly soils, and they have a thick, dark-colored surface horizon that is lacking in the Canandaigua soils. Wayland soils occur along all the major streams of the county, except those on the Plateau in the extreme southwestern part.

Typical profile of Wayland silt loam (in a level hayfield, 1½ miles northeast of the village of Alexander):

AP—0 to 9 inches, very dark gray (10YR 3/1) silt loam, very dark grayish brown (10YR 3/2) when crushed; moderate, medium, granular structure that is compacted into weak, fine to medium, subangular blocky structure; common, fine, faint mottles of dark brown (10YR 3/3); friable; neutral; numerous worm casts; clear, smooth boundary. Horizon is 8 to 10 inches thick.

C1g—9 to 25 inches, dark-gray (10YR 4/1) silt loam having very dark gray (10YR 3/1) interiors; many, fine, distinct mottles of very dark yellowish brown (10YR 3/4); very weak, coarse, subangular blocky structure; friable; some worm casts; mildly alkaline; gradual, smooth boundary. Horizon is 13 to 18 inches thick.

C2g—25 to 40 inches +, very dark gray (10YR 3/1) silt loam; some dark-gray (10YR 4/1) silt coatings in pores; common, medium, distinct mottles of very dark yellowish brown (10YR 3/4); massive; a few very fine sandy loam varves; friable; calcareous.

The A horizon is mainly silt loam, but in small areas it is light silty clay loam. Below a depth of 20 inches, there are strata of very fine sandy loam in some places. The profile generally is nearly neutral, but in places it is calcareous in the lower part, and it is slightly acid in areas where the Wayland soils intergrade to the Holly soils. A lack of distinct mottles within 16 inches of the surface distinguishes the moderately well drained Eel soils. In places where distinct mottles occur in the A1 horizon and few to common mottles are in the upper C horizon, the Wayland soils intergrade to the very poorly drained Sloan soils. The depth of Wayland soils to bedrock ranges from 6 to 40 feet.

General Nature of the County

This section provides general information about Genesee County. It discusses geology, physiography, drainage, climate, agriculture, and other subjects of general interest.

Geology [6]

Formations of both the Devonian and the Silurian ages occur in Genesee County (*15*), but those of the Silurian age are rare except for outcrops of the Bertie limestone. Rocks of the Devonian age crop out in the Onondaga escarpment, a prominent feature that extends east and west through the county. It lies north of Le Roy and Batavia, and from there it passes westward and to the south of Oakfield and the Tonawanda Indian Reservation. The Onondaga escarpment is formed by resistant dolomites, which are part of the Bertie limestone member of the Silurian age, and by the Onondaga limestone formation of the middle Devonian age. Rock outcrops of the Hamilton, Genesee, Sonyea, Java, and West Falls groups occur south of the Onondaga escarpment, but in most places they are confined to stream valleys, where they have been exposed by degrading streams. Although exposures are numerous in the county, they are generally small and of limited extent.

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[6] By F. M. Dickinson, geologist, Soil Conservation Service.

The major geologic structure in this part of the State is the northeast-southwest trending Clarendon Fault. In Genesee County this is a monocline in the middle and upper Devonian shales and is a fault in the more resistant rocks of the Onondaga formation and the Bertie group. It is directly responsible for the southern offset of the Onondaga escarpment between Batavia and Linden.

During the Wisconsin glacial stage of the Pleistocene epoch, Genesee County was completely covered by ice. Although the Wisconsin stage of glaciation has been divided into four substages, only the last two substages occur in this county. In New York State, they are called the Valley Heads drift sheet and the Hamburg-Marilla drift sheet. The latter is the younger of the two. The two drift sheets are briefly described in the following paragraphs.

In Genesee County the Hamburg-Marilla drift sheet consists of glacial till deposited as ground moraines and drumlins and in proglacial lacustrine sediments. The glacial till is characterized by a high carbonate content that resulted from glacial scouring of the dolomites of the Lockport group, the dolomitic shales of the Camillus formation of the Saline group, and the dolomites of the Bertie group. In addition, the till has a distinctive red color that came from glacial scouring of the Vernon shale formation of the Salina group. Geographically, the till is restricted to the drumlin region and the northern part of the ground moraine in the Ontario Lowlands Province, generally north of and parallel to the New York State Thruway.

The proglacial lacustrine deposits consist dominantly of fine sand and silt laid down in glacial Lake Warren. These deposits occur mainly in the western part of the county, north of U.S. Highway 20.

The Valley Heads drift sheet consists of glacial till deposited as ground moraines and in proglacial fluvial deposits. The till lacks the red color, but it is similar in texture and origin to the till in the Hamburg-Marilla drift sheet. Generally, it is brown to brownish gray or gray. These colors reflect the influence of material that came from glacial scouring of the middle and upper Devonian shales, south of Batavia. From north to south, the till has an increasingly lower carbonate content and an increasingly higher shale content. These variations toward the south reflect the increasing effect of shale and the decreasing effect of dolomite and limestone in the makeup of the till.

The proglacial fluvial deposits consist chiefly of stratified sand and gravel laid down by glacial melt water and by proglacial streams draining the southern highlands. Most of the material left by glacial melt water is in kames and kame terraces in the Tonawanda Creek valley between Brookville and Attica, east of the New York Central Railroad (Attica branch), and north and west of Batavia in the vicinity of Bushville. Other kame deposits occur north of East Bethany, northeast of Pavilion Center, east of Pembroke, and southeast of Darien. The material left by proglacial streams generally consists of valley train and deltaic deposits in the Tonawanda Creek valley between Brookville and Batavia, in the Oatka Creek valley between Pavilion Center and Roanoke, at East Bethany, and small deposits associated with material left by glacial melt water.

The postglacial deposits in the county consist of recent alluvium along existing streams, as well as muck and peat in swamps. Recent alluvium occurs on first bottoms along most of the streams, but the largest areas are along Tonawanda Creek from Attica to North Pembroke and along Oakta Creek from the Wyoming County line to Pavilion Center. Muck and peat are mainly in the Oak Orchard and Bergen Swamps, in the Byron and Batavia Swamps, and in the swamps west of East Pembroke and east of North Pembroke.

Physiography and Drainage

Genesee County is in two of the major physiographic provinces of New York State. The northern two-thirds of the county is in the Ontario Lowlands, which are part of the Erie-Ontario Lowlands. The southern third is in the Appalachian Uplands.

The Ontario Lowlands border the southern shore of Lake Ontario, where the elevation is 244 feet above sea level. From Oak Orchard Swamp, which occurs at an elevation of 620 feet in Genesee County, the lowlands extend southward to an elevation of about 1,000 feet, where they form a boundary with the Appalachian Uplands.

The lowlands in the county can be divided into four subareas on the basis of relief: (1) the drumlin area, (2) the ground moraine area, (3) the outwash plain area, and (4) the glacial lake area.

The drumlin area, located in the north-central and northeastern parts of the county, is characterized by low, hilly relief. The hills are drumlins, or elongated deposits of calcareous glacial till that range from ½ mile to 2 miles in length and from 70 to 120 feet in height. These drumlins are parallel and extend in a northeast-southwest direction.

The ground moraine area is in the central part of the county. From a point just west of Colby road and north of the Erie Lackawanna Railroad, it extends south of Batavia and eastward to Le Roy, thence eastward to the Livingston County line between State Route 5 and U.S. Highway 20. The relief is low, gently rolling, and hummocky. Although the elevation ranges from 900 to about 1,000 feet, the difference in elevation generally is 30 feet or less in any given part of the area, though it is as much as 50 feet in some places.

The outwash plain area, together with related deposits, lies mainly in the valley of Tonawanda Creek southeast and east of Batavia. In addition, there are smaller deposits of outwash along Murder, Black, and Oatka Creeks. The glacial outwash is mainly in a valley train laid down by streams of glacial melt water and in kames deposited by melt water in the ablation part of a glacier. The valley train occurs chiefly to the east of Tonawanda Creek, where the relief is exceptionally uniform and the elevation ranges only from 890 to 950 feet above sea level. Kames are closely associated with the valley train. They appear as hills that are generally circular in shape and, on the average, rise 50 feet above the surrounding landscape. Kames are most extensive west and southwest of East Alexander and Bethany, along the east side of Tonawanda Creek from Alexander to the Wyoming County line, and in the valley from Darien to Attica. The outwash deposits at East Bethany and Pavilion Center are

similar to those in the Tonawanda Creek valley, but they cover a much smaller acreage. Between Brick House Corners and Pembroke Center is an isolated deposit of outwash that is kamic in origin.

The glacial lake area is in the western part of the county, where it extends from just north of U.S. Highway 20 northward to Oak Orchard Swamp. This area is level or nearly level and is less than 880 feet above sea level, the elevation of glacial Lake Warren.

The southern part of the county, east and west of the Tonawanda Creek valley, is located in the Appalachian Uplands province, which is generally referred to as the Allegheny Plateau. This area is moderately steep or steep and has elevations of more than 1,000 feet.

Genesee County is drained by the Niagara River, the Genesee River, and Oak Orchard Creek. These streams enter Lake Ontario and are part of the drainage system of the St. Lawrence River.

Water Supply

In areas of the county where water is not supplied by a municipal facility, it is obtained from drilled wells. Water for a few homes in rural sections is provided by shallow wells or developed springs. Ponds or streams commonly furnish water for livestock.

The city of Batavia obtains water from Tonawanda Creek and also from supplementary wells. The villages of Le Roy, Alexander, and Darien depend on reservoirs. Drilled wells supply water for the communities of Bergen, Corfu, Elba, Oakfield, and Pavilion.

Several areas, mainly south of Batavia, are suitable as sites for small reservoirs, and there are a few sites that can be used for multipurpose impoundments.

Climate [7]

Genesee County has a climate of the humid, continental type. The flow of atmospheric air is dominantly from continental sources. Warm, occasionally humid weather results when the flow is from the south or southwest, and cold, dry weather is a result of flow from the northwest or north. Occasionally, air from maritime sources reaches the county from well-developed weather systems off the mid- or north-Atlantic coast. Such easterly flow of air brings cool, cloudy, and often damp weather.

Summers are warm in this county. Winters are long and cold, and there are frequent periods of stormy, unsettled weather. Monthly precipitation is at a minimum during winter whereas maximum amounts occur late in spring and in summer. Although climate in the county is chiefly continental, the ranges in temperature are smaller than those in the more centrally located areas of North America. The variation of seasonal precipitation is relatively small, even in comparison with other parts of New York State.

Table 11 gives temperature and precipitation data compiled from records of the United States Weather Bureau at Batavia. Temperature data for Batavia, listed in table 11 and discussed in the following paragraphs, are reasonably applicable to at least the northern two-thirds of the county. For the higher elevations in the southern one-third, some adjustments are needed. In the higher areas the temperature tends to be lower and there is a corresponding influence on the length of the freeze-free growing season, the duration of snow cover, and other factors of climate affected by temperature.

[7] By A. BOYD PACK, State climatologist, U.S. Environmental Science Services Administration, Weather Bureau.

TABLE 11.—*Temperature and precipitation at Batavia, N.Y.*

[Elevation 900 feet]

Month	Temperature					Precipitation						
	Average daily maximum [1]	Average daily minimum [1]	7 years in 10 will have—			Average total [1]	Record minimum [1]	3 years in 10 will have—		Average number of days with 0.10 inch or more [3]	Snow	
			Maximum equal to or higher than [1]—	Minimum equal to or lower than [1]—	Average heating degree days [1] [2]			More than [1]—	Less than [1]—		Average total [4]	7 years in 10 will have more than [4]—
	°F.	°F.	°F.	°F.		In.	In.	In.	In.		In.	In.
January	31	16	47	−2	1,285	2.1	0.8	2.4	1.5	5	21	16
February	32	16	48	0	1,150	2.2	.8	2.5	1.8	6	22	15
March	40	24	64	10	1,025	2.5	.8	2.9	1.9	6	17	9
April	54	35	74	24	615	3.0	1.2	3.5	2.2	7	4	1
May	66	45	80	33	295	2.9	.5	3.6	2.2	6	(5)	(6)
June	76	55	89	45	70	2.7	.9	3.7	2.0	6	0	0
July	81	59	90	50	20	3.0	.9	3.4	2.0	7	0	0
August	79	58	88	46	35	3.1	1.0	3.7	2.1	7	0	0
September	72	50	86	35	140	2.8	.5	3.3	2.1	6	0	0
October	61	41	78	29	435	2.5	.1	3.2	1.2	6	(5)	(6)
November	46	32	67	20	780	2.6	.8	2.9	2.0	7	11	4
December	34	20	50	4	1,180	2.2	.7	2.3	1.8	5	18	12
Year	56	38	91	−2	7,030	31.6	22.4	34.5	28.8	74	93	75

[1] Based on 30-year record.
[2] Base of 65° F. daily mean temperature.
[3] Based on 10-year record.
[4] Based on 29-year record.
[5] Less than 0.5 inch but more than 0.
[6] 1 year in 10 will have more than 1 inch.

This county is subject to a variety of weather conditions because it lies in or near the path of most major weather systems that move across the continent. Temperatures and other atmospheric conditions tend to change from day to day and from week to week. Seasonal weather varies from year to year.

The Great Lakes are near enough to influence greatly the climate in the county. For example, they have a moderating effect on temperature. Summertime heating is less than in areas farther away from these large bodies of water. Consequently, thunderstorms are reduced in number and frequency, and there is less damage from hail and strong winds. The moderating effect of the lakes also reduces cooling at night and thus provides a growing season that is longer than that in areas at a greater distance from the lakes. Also influencing the climate are differences in relief and elevation, but these are secondary to the effect of the Great Lakes.

Temperature

The temperature usually varies noticeably, both in extremes and in averages, from day to day and from week to week. At times, however, there is little or no change in temperature for several days to a week or more. For example, in summer the weather may stay rather warm or in winter the temperature may remain below freezing for a week or longer. A sharp drop in temperature within a few hours is not common, though an occasional drop of 25 to 40 degrees within 24 hours can occur in winter or early in spring if a mass of very cold air arrives. Warming trends of appreciable magnitude are spread over a longer period, and the change in temperature is usually less abrupt.

The temperature reaches 90° F. or higher on an average of 7 days per year, almost entirely in June, July, and August. The number of days varies from 0 in especially cool summers to 12 or more in exceptionally warm summers. Temperatures of 90° or higher occur in September about 1 year in 2, but they are rare in May. At Batavia, such a high temperature in May has occurred on only two dates in a 30-year period. A temperature of 100° or higher has been recorded only once in 30 years.

Temperatures of 0° or below can be expected on 5 to 10 days in most winters. If winter is particularly mild, the number of such days is usually not more than 2; if it is severe, the number is at least 15. Temperatures of 0° or below occur as early as mid-December about 1 year in 3, but in most years they do not occur until January. Such low temperatures are to be expected through the first week of March. A temperature of —15° or lower occurs about 1 year in 5. In most winters the lowest temperature ranges between 0° and —8°. From late in November to late in March, 40 to 50 days on which the temperature does not rise above 32° can be expected.

Ordinarily, the last date in spring having a temperature of 32° or below is between May 5 and 10 in the northern two-thirds of the county, and the first date in fall is between October 5 and 10. In most years the last freezing temperature in spring occurs between April 25 and May 20, and the first freezing temperature in fall occurs between September 25 and October 20.

In all parts of the county except along the southern edge, the freeze-free growing season is 150 to 155 days. At Batavia and in similar areas, the length of the freeze-free season has ranged from 120 to 180 days, but in 7 years out of 10 it has been between 135 and 170 days. Near the southern edge of the county, where elevations are greater than 1,000 feet, the estimated freeze-free growing season is 140 to 145 days.

Data on the probability of low temperatures in spring and in fall are given in table 12. Additional information on freezing temperatures in Genesee County and other sections of New York State can be found in literature citations (*6*) and (*7*).

TABLE 12.—*Probability of last freezing temperature in spring and first in fall* [1]

[Data apply to areas in the county having elevations of 600 to 1,000 feet]

Month	Dates for given probability and temperature					
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower	36° F. or lower
Spring:						
1 year in 10 later than	April 3	April 13	April 16	May 1	May 24	June 4.
3 years in 10 later than	March 25	April 4	April 12	April 25	May 14	May 25.
5 years in 10 later than	March 19	March 29	April 7	April 19	May 7	May 18.
7 years in 10 later than	March 13	March 22	April 3	April 14	April 30	May 11.
9 years in 10 later than	March 4	March 13	March 27	April 7	April 20	May 1.
Fall:						
1 year in 10 earlier than	November 15	November 8	October 27	October 3	September 22	September 9.
3 years in 10 earlier than	November 23	November 17	November 5	October 14	October 1	September 17.
5 years in 10 earlier than	November 29	November 23	November 11	October 22	October 7	September 23.
7 years in 10 earlier than	December 5	November 30	November 18	October 30	October 13	September 29.
9 years in 10 earlier than	December 13	December 9	November 22	November 10	October 22	October 8.

[1] The following example illustrates how to use and interpret the data in this table. Take a temperature of 32° F. or lower. In 1 year out of 10 (10 percent probability), a temperature of 32° or below can be expected to occur later than May 24; in 5 years out of 10 (50 percent probability), a temperature of 32° or below can be expected to occur later than May 7. The fall dates are interpreted similarly for a given temperature, but the occurrence is earlier than the given date.

Precipitation

The average annual precipitation is 31 to 32 inches in the northern and central parts of the county, but it increases to 34 or 35 inches along the southern edge. In most years the total annual precipitation is within 4 inches of the respective average. Based on a 30-year record, however, the total at Batavia has ranged from 22.4 to 41.7 inches. Table 13 compares the average monthly and yearly precipitation at Batavia, Stafford, and Linden.

During the May–September portion of the growing season, the average total precipitation is 14 to 15 inches in the northern half of the county and is 16 to 17 inches in the southern part. These amounts make up 45 to 50 percent of the total annual precipitation. Total rainfall in this 5-month period has ranged from 8 to more than 20 inches in the northern half of the county and from less than 10 to more than 25 at the higher elevations along the southern edge. In 7 years out of 10, however, the county generally can expect 11 to 20 inches of precipitation during this period.

Precipitation is well distributed by months throughout the year. Normally, the amount and distribution of rainfall during the growing season are adequate for the growth of suitable crops and other plants. Genesee County, however, receives less rain during the growing season than the more hilly parts of the State, and the chance that rainfall will be deficient is a little greater, though serious drought is not a frequent hazard. In one or two growing seasons out of 10, precipitation is deficient for a period long enough that crops are seriously affected.

TABLE 13.—*Comparison of average monthly precipitation at Batavia, Stafford, and Linden, N.Y.*

[Averages are for the same 30-year period, 1934–1963]

Month	Total precipitation		
	Batavia (elevation 900 feet)	Stafford (elevation 915 feet)	Linden (elevation 1,120 feet)
	Inches	*Inches*	*Inches*
January	2. 1	2. 1	2. 3
February	2. 2	2. 1	2. 4
March	2. 5	2. 3	2. 5
April	3. 0	2. 9	3. 1
May	2. 9	2. 9	3. 2
June	2. 7	2. 6	3. 3
July	3. 0	2. 9	3. 0
August	3. 1	2. 9	3. 3
September	2. 8	2. 9	3. 3
October	2. 5	2. 6	3. 1
November	2. 6	2. 5	3. 0
December	2. 2	2. 0	2. 3
Year	31. 6	30. 7	34. 8

Precipitation during the growing season usually comes from showers and occasional thunderstorms. The weather that brings summer showers usually prevails from 6 to 18 hours, but occasionally an extensive, slow-moving storm produces steady but less intense rainfall for as long as 24 hours. Amounts of 1 inch or more in 24 hours can be expected on 4 to 8 days per year in the northern half of the county. Near the southern edge the frequency is slightly higher. The probability is somewhat greater in the warm-season months. Rainfall of more than 2 inches per day is rare because the Great Lakes nearby tend to reduce heavy thunderstorm and shower activity. Precipitation in winter usually falls as snow but occasionally it may fall as rain or drizzle.

Snow

The Great Lakes have an important influence on snowfall in Genesee County. During the colder months, air that has flowed across the open water of the lakes brings frequent and abundant snowfall to the adjacent land. Snowfall is extensive, and locally it is heavy. Late in winter, when more of the lake surface is covered with ice, the storms are less intense.

Genesee County is within the range of most lake-effect snowstorms that come off Lake Erie, and it is affected by a smaller percentage of those that move off Lake Ontario. In addition, snowfall in the county is influenced by winter storms that move across the continent or up the Atlantic Coast. Lake-effect snowstorms occur after the center of low pressure systems has passed.

The average winter snowfall is 90 to 100 inches, and there is little variation from one part of the county to another. Winters having a total snowfall of more than 110 inches occur about 1 year in 3, but winters having less than 70 inches of total snowfall are rare.

Snowfall is frequently heavy, both in terms of individual storms and monthly amounts. At least one storm per winter, resulting from the combination of a major storm system and the subsequent flow of air off the Great Lakes, can be expected to yield more than 12 inches of snow. Heavy snow squalls off the lakes are often accompanied by strong winds, and these cause severe drifting in roads and highways. Except during an occasional lake-effect storm, however, drifting snow is generally not a serious concern in the county.

Snowfall in excess of 24 inches per month is fairly common from December through March, and so is a total snowfall of more than 12 inches in November. The highest monthly total recorded at Batavia is 50 inches.

The snowfall season usually begins in early or mid-November and continues through the early half of April. The ground is covered by 1 inch or more of snow continuously, or nearly continuously, from early December through the middle or latter part of March. As a rule, snow cover can also be expected for short periods in November and April. Although periods of thawing are common in midwinter, snowstorms are so frequent that the ground is bare for only a few days. Snow is likely to accumulate to a depth of more than 12 inches for one or more periods in winter in all parts of the county.

The climate of the county favors a considerable amount of cloudiness in winter. Ordinarily, 185 to 195 days per year are cloudy, and 20 to 25 cloudy days can be expected in each of the months from November through March. From 55 to 65 days per year are clear, and 115 to 125 days are partly cloudy. During the period from May through October, 6 to 9 days per month are bright and clear.

Observations at nearby Buffalo and Rochester suggest that the percentage of possible sunshine in Genesee County is 30 to 35 percent in November and December, and it increases to nearly 70 percent in June, July, and August.

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The prevailing wind is west-southwesterly in winter and spring, but it is southwesterly to southerly in summer and fall. As suggested from records at Buffalo and Rochester, the wind velocity is about 8 to 10 miles per hour in summer and is about 12 to 14 miles per hour from November through April. The wind may occasionally damage property and crops in a locally severe thunderstorm or during passage of a vigorous pressure system. High winds that accompany a lake-effect snowstorm can cause blowing and drifting of snow, but violent and damaging windstorms are not a serious hazard.

Thunderstorms occur on 20 to 30 days a year. A few of these storms are accompanied by heavy rain, locally damaging wind, or both. If the downpour of rain is intense, it can cause flooding and erosion. Although hail accompanies some of the more severe thunderstorms, it is not regarded as a serious risk to crops or property.

Dense fog occurs on about 10 to 15 days per year. In summer the relative humidity averages between 55 and 60 percent in the afternoon. An uncomfortable combination of high temperature and high humidity is rare.

In terms of area and number of people affected, heavy snows are probably the most serious of the severe storm hazards in the county. At times when lake-effect storms bring heavy windblown snow, visibility is greatly reduced, highways are covered by drifted snow, and travel is hazardous or impossible. In this county, however, true blizzards are relatively rare.

Although one tornado has been recorded in the county since its settlement, there is a possibility of such storms. Nearly every winter a severe storm brings freezing rain. The county is not within the usual path of hurricanes, but rarely a hurricane crosses the interior of the State and causes heavy rain and high winds in Genesee County.

Vegetation

Before the first settlers arrived, nearly all of Genesee County was forested. Only small areas of fresh water marsh were free of trees. The better drained soils supported stands of beech, basswood, sugar maple, oak, white ash, hickory, and chestnut. On the more poorly drained soils were stands of American elm, red maple, hemlock, white pine, and northern white cedar. Several stands of the original forest remain in the Bergen Swamp and the Oak Orchard Swamp, but in recent years the chestnut and American elm have been virtually eliminated by disease.

Where idle fields are allowed to revert to trees, the better drained soils are generally covered with hawthorn, aspen, white ash, maple, or beech. The wetter soils ordinarily produce a heavy cover of dogwood and viburnum, but these plants are followed by various kinds of soft maple. Some areas formerly used for crops have been planted to coniferous trees, mainly larch, Scotch pine, and Norway spruce.

Settlement

The first settlement in what is now Genesee County was made in 1793 near the present village of Le Roy. These early settlers, and most of the others, came from eastern New York State and New England.

The original county, laid out in 1802, occupied the larger part of the State lying west of the Genesee River, as well as areas east of the river that are now Livingston and Allegany Counties. During the early 1900's, the county was reduced in size several times as neighboring counties were formed.

The first wagon road through Genesee County was built in 1798. The completion of the Erie Canal, which passed about 10 miles north of the county, stimulated growth. The first rail service was established in 1836.

Population

Until 1850, the population of the county rose sharply because of settlers moving in from the east. Since that time the population has increased from 33,000 in 1880 to 38,000 in 1930 and 53,994 in 1960.

The rural population was 28,000 in 1880 and 31,122 in 1960. Although the number of rural residents is increasing, the number of persons engaged in farming is decreasing. Between 1950 and 1960, there was an increase of 61.5 percent in the number of residents engaged in nonfarm occupations but living in rural areas. During the same period, the number of rural residents engaged in farming decreased by 36.4 percent.

Batavia, the largest city and the county seat, had a population of 18,210 in 1960. Le Roy, the largest village, had a population of 4,662. Other villages are Oakfield, Corfu, Alexander, Bergen, and Elba.

Industry, Transportation, and Markets

Genesee County has many industries. In Batavia and Le Roy, the major industries are engaged in manufacturing and foundry work. The chief products manufactured include power-loading and grading equipment used in construction, television sets, electronic parts, and electrical insulators. Gypsum mines are at Oakfield, and so are plants that make plaster and wallboard products. Several food-processing plants are located in the county.

The county is served by four railroads. They are the New York Central, Erie Lackawanna, Lehigh Valley, and Baltimore and Ohio.

Among the many roads that serve all parts of the county are the New York State Thruway, U.S. Highway 20, and nine State highways. Commercial airline service is available at Buffalo and Rochester, both of which are about 40 miles from Batavia.

Except for local food-processing plants, the market for fresh vegetables and dairy products is mainly in the Buffalo and Rochester areas. In winter, however, onions and potatoes are marketed throughout the eastern part of the United States. Some onions have been exported to Europe. Also exported, mainly to Latin-American countries, is about one-third of the annual crop of dry beans.

Agriculture and Land Use

The 1964 census shows that 69 percent, or 221,227 acres, of Genesee County is in farms. This includes 162,565 acres of cropland, 36,822 acres of pasture, and 25,160 acres of woodland. Dairying is the chief type of farming, but the production of general crops and vegetable crops also is important.

The number of farms in the county has decreased steadily from 3,476 in 1880 to 2,885 in 1920, 1,585 in 1959,

and 1,297 in 1964. The average size of farms has increased from 90 acres in 1880 to about 95 acres in 1920 and to 170.6 acres in 1964.

Before 1920, the main crops were wheat, oats, corn, rye, barley, buckwheat, beans, and cabbage. In more recent years the production of barley, rye, and buckwheat has decreased and a larger acreage has been used for the growing of canning crops, such as peas, snap beans, beets, sweet corn, carrots, and tomatoes.

Several areas of muck occur in the county, and these are used mainly for producing onions and potatoes. Also grown are some kinds of leafy vegetables, as well as turf grasses.

In 1964, corn was grown on 22,978 acres. About half of the corn crop was harvested for silage, and the rest for grain. The acreage used for producing dry beans is variable; it ranges from 5,000 to 11,000 acres per year. Alfalfa, the principal hay crop, was grown on 36,236 acres in 1964.

The number of dairy animals remained nearly constant from the early 1900's to 1945. About 11,000 animals were kept during this period, but the number increased to 18,772 in 1964. Beef cattle, poultry, sheep, and swine are also produced in the county, but they are less important than dairy cattle.

The 1964 census classes 880 farms as commercial farms, or two-thirds of the total number in the county.

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Glossary

Acid soil. See Reaction.

Aggregate, soil. Many fine particles held together in a single mass or cluster, such as a clod, crumb, block, or prism.

Alkaline soil. See Reaction.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Associated soils. Soils closely located geographically in the landscape to a given soil.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Calcareous. A soil or soil layer containing enough calcium carbonate to effervesce (fizz) when treated with dilute hydrochloric acid.

Catena. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

Chroma. See Color, Munsell notation.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Coarse fragments. Mineral or rock particles more than 2 millimeters in diameter.

Coarse-textured soils. Sand and loamy sand.

Cobblestone. A rounded stone fragment 3 to 10 inches in diameter.

Color, Munsell notation. A system for designating color by degrees of three simple variables—hue, value, and chroma. For example, the notation 10YR 6/4 stands for a color with a hue of 10YR, a value of 6, and a chroma of 4. Hue is the dominant spectral color; value relates to the relative lightness of color; chroma is the relative purity or strength of color and increases as grayness decreases.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour tillage. Plowing, cultivating, planting and harvesting in rows that are at right angles to the natural direction of slope.

Contrasting layer. A soil layer that is of a different geologic origin than the layer above it. This difference is not to be confused with differences caused by soil-forming processes.

Depth, soil. The depth of soil material that plant roots can penetrate readily to obtain water and nutrients. It is the depth to a layer that, in physical or chemical properties, differs from the overlying material to such extent as to prevent or seriously retard the growth of roots. The depth classes are: (1) *Deep*, more than 40 inches; (2) *moderately deep*, 20 to 40 inches; (3) *shallow*, 10 to 20 inches; (4) *very shallow*, less than 10 inches.

Drainage, soil. The relative rapidity and extent of removal of water from on and within the soil, under natural conditions. Terms commonly used to describe drainage classes of soils are as follows:

Very poorly drained.—Water is removed so slowly that the soil remains wet most of the time and water ponds on the surface frequently.

Poorly drained.—Water is removed so slowly that the soil is wet for a large part of the time.

Somewhat poorly drained.—Water is removed slowly enough to keep the soil wet for significant periods but not all of the time.

Moderately well drained.—Water is removed from the soil somewhat slowly so that the profile is wet for a small but significant part of the time.

Well drained.—Water is removed from the soil readily but not rapidly.

Excessively drained.—Water is rapidly removed from the soil.

Drumlin. An elongated, oval hill or ridge that is composed of glacial drift, normally compact and unstratified, generally with its longer axis conforming to the direction of the movement of the ice responsible for its deposition.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Eolian soil material. Soil parent material accumulated through wind action; commonly refers to sandy material in dunes.

Erosion. The wearing away of the land surface by wind, running water, and other geological agents.

Esker. A narrow, winding ridge or mound of stratified gravelly and sandy drift that was deposited by a subglacial stream.

Fine-textured soils. Sandy clay, silty clay, and clay.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A dense, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glacial drift. Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted materials deposited by streams flowing from glaciers.

Glacial till. Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the subsoil or substratum, as a result of poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Gravel. Some fragments consisting of rounded pebbles 2 millimeters to 3 inches in diameter.

Gritty. A term used to describe soil material that contains an appreciable amount of coarse sand and fine gravel.

Horizon, soil. A layer of soil, approximately parallel to the surface, face, that has distinct characteristics produced by soil-forming processes.

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. This layer is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is known to be different from that in the solum, a Roman numeral precedes the letter, C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Hue. See Color, Munsell notation.

Humus. The well-decomposed, relatively stable part of the organic matter in mineral soils.

Illite. The dominant type of clay mineral in the soils of New York State.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Inclusion. A kind of soil that has been included in mapping a soil of a different kind because the area was too small to be mapped separately on a map of the scale used.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Kame. An irregular, short ridge, or hill, of stratified glacial drift.

Kettle. A depressional area that has no surface drainage outlet.

Lacustrine. Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Loam. A textural class for soils. Loam contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Maping unit, soil. Areas of soil of the same kind outlined on the soil map and identified by a symbol.

Medium-textured soils. Very fine sandy loam, loam, silt loam, and silt.

Moderately coarse textured soils. Sandy loam and fine sandy loam.

Moderately fine textured soils. Clay loam, sandy clay loam, and silty clay loam.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons of the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance *few*, *common*, and *many*; size—*fine*, *me-*

dium, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell color notation. See Color, Munsell notation.

Neutral soil. See Reaction.

Nitrogen. In this survey, nitrogen in the soil refers to any nitrogen-bearing compound that contains nitrogen available to plants.

Parent material. The horizon of weathered rock or partly weathered soil material from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. The permeability classes are (1) *very slow*, less than 0.063 inch per hour; (2) *slow*, 0.063 to 0.2 inch per hour; (3) *moderately slow*, 0.2 to 0.63 inch per hour; (4) *moderate*, 0.63 to 2.0 inches per hour; (5) *moderately rapid*, 2.0 to 6.3 inches per hour; (6) *rapid*, 6.3 to 12.0 inches per hour; and (7) *very rapid*, more than 12.0 inches per hour.

pH. See Reaction.

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.

Profile, soil. A vertical section of soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction, because it is neither acid nor alkaline. In words the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

In this survey the terms *weakly calcareous* and *calcareous* are used for pH values above 7.5.

Relief. The elevations or inequalities of a land surface, considered collectively.

Runoff. Rainwater that flows over the surface of the soil without sinking in; or the total volume of surface flow during a specified time.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Surface soil. The soil ordinarily moved in tillage or its equivalent in uncultivated soil, about 5 to 10 inches in thickness.

Terrace. A nearly level or undulating plain, commonly rather long and narrow and having a steep front that faces a river bottom.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Value. See Color, Munsell notation.

Variant, soil. A soil having properties sufficiently different from other known soils to justify a new series name but occupying a geographic area so limited that creation of a new series is not believed to be justified.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Estimated yields, tables 1 and 2, pp. 20 and 24, respectively.
Management of soils as woodland, table 3, p. 26.
Rating for wildlife habitat elements and classes of wildlife, table 4, p. 30.
Engineering uses of soils, tables 5, 6, and 7, pp. 38 through 73.
Nonfarm uses of soils, table 8, p. 76.
Acreage and extent, table 9, p. 102.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group
			Symbol	Page	Number
Ad	Alden mucky silt loam	101	IVw-4	18	21
AeA	Allis silty clay loam, deep, 0 to 4 percent slopes	103	IVw-2	18	18
Al	Alluvial land	103	Vw-1	19	20
AnA	Angola silt loam, 0 to 3 percent slopes	104	IVs-3	19	16
AnB	Angola silt loam, 3 to 8 percent slopes	104	IVs-3	19	16
ApB	Appleton silt loam, 3 to 8 percent slopes	104	IIIw-5	16	15
ArB	Arkport very fine sandy loam, 1 to 6 percent slopes	105	IIe-3	13	1
ArC	Arkport very fine sandy loam, 6 to 12 percent slopes	105	IIIe-3	15	1
AsD	Arkport and Dunkirk soils, 12 to 20 percent slopes	105	IVe-1	17	1
AsE	Arkport and Dunkirk soils, 20 to 40 percent slopes	105	VIe-1	19	2
BeB	Benson soils, 0 to 8 percent slopes	106	IIIs-1	16	19
BeD	Benson soils, 8 to 25 percent slopes	106	IVs-1	18	19
BeE	Benson soils, 25 to 40 percent slopes	106	VIIs-1	20	22
BuA	Burdett silt loam, 0 to 3 percent slopes	107	IIIw-1	16	16
BuB	Burdett silt loam, 3 to 8 percent slopes	107	IIIw-4	16	16
CaA	Canandaigua silt loam, 0 to 2 percent slopes	107	IVw-1	18	20
CdA	Canandaigua mucky silt loam, 0 to 2 percent slopes	107	IVw-4	18	21
CeA	Cazenovia silt loam, 0 to 3 percent slopes	108	IIw-2	14	8
CeB	Cazenovia silt loam, 3 to 8 percent slopes	108	IIe-6	14	8
CeC	Cazenovia silt loam, 8 to 15 percent slopes	108	IIIe-4	15	8
CgC3	Cazenovia silty clay loam, 8 to 15 percent slopes, eroded	108	IVe-5	18	8
CgD3	Cazenovia silty clay loam, 15 to 25 percent slopes, eroded	108	VIe-2	19	8
ChA	Chenango shaly silt loam, 0 to 3 percent slopes	109	I-2	12	6
ChB	Chenango shaly silt loam, 3 to 8 percent slopes	109	IIe-2	13	6
ChC	Chenango shaly silt loam, 8 to 15 percent slopes	109	IIIe-2	14	6
ClB	Collamer silt loam, 2 to 6 percent slopes	109	IIe-5	13	1
CmB	Colonie loamy fine sand, 2 to 6 percent slopes	110	IIIs-2	17	7
CmC	Colonie loamy fine sand, 6 to 12 percent slopes	110	IVs-2	19	7
CoA	Conesus silt loam, 0 to 3 percent slopes	111	IIw-2	14	3
CoB	Conesus silt loam, 3 to 8 percent slopes	111	IIe-4	13	3
CoC	Conesus silt loam, 8 to 15 percent slopes	111	IIIe-6	15	3
DaA	Darien silt loam, 0 to 3 percent slopes	112	IIIw-1	16	16
DaB	Darien silt loam, 3 to 8 percent slopes	112	IIIw-4	16	16
DaC	Darien silt loam, 8 to 15 percent slopes	112	IIIe-5	15	16
DaD	Darien silt loam, 15 to 25 percent slopes	112	IVe-3	17	8
DuB	Dunkirk silt loam, 2 to 6 percent slopes	113	IIe-3	13	1
DuC	Dunkirk silt loam, 6 to 12 percent slopes	113	IIIe-3	15	1
Ed	Edwards muck	113	VIIw-2	20	21
Ee	Eel silt loam	114	IIw-3	14	1
ElB	Elnora loamy fine sand, 2 to 6 percent slopes	114	IIe-5	13	7
Fo	Fonda mucky silt loam	115	VIw-1	19	21
FrA	Fremont silt loam, 0 to 3 percent slopes	115	IIIw-1	16	17
FrB	Fremont silt loam, 3 to 8 percent slopes	115	IIIw-4	16	17
FrC	Fremont silt loam, 8 to 15 percent slopes	115	IIIe-5	15	17
Fw	Fresh water marsh	116	VIIIw-1	20	21
GmA	Galen and Minoa very fine sandy loams, 0 to 2 percent slopes	116	IIw-1	14	10
GnB	Galen very fine sandy loam, 2 to 6 percent slopes	116	IIe-5	13	1
Gs	Genesee silt loam	117	I-1	12	1
HaA	Halsey silt loam, 0 to 4 percent slopes	117	IVw-1	18	20

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland group Number
HlA	Hilton loam, 0 to 3 percent slopes	118	IIw-2	14	3
HlB	Hilton loam, 3 to 8 percent slopes	118	IIe-4	13	3
Hm	Holly silt loam	118	IVw-3	18	20
HnB	Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes	119	IIe-1	13	5
HoB3	Hornell silty clay loam, 3 to 8 percent slopes, eroded	119	IIIe-8	15	18
HoC3	Hornell silty clay loam, 8 to 15 percent slopes, eroded	119	IVe-5	18	18
HsD3	Hornell and Fremont soils, 15 to 25 percent slopes, eroded	120	VIe-2	19	17
IoA	Ilion silt loam, 0 to 3 percent slopes	120	IVw-2	18	20
IoB	Ilion silt loam, 3 to 8 percent slopes	120	IVw-2	18	20
KeA	Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes	121	IVs-3	19	15
La	Lakemont silty clay loam	121	IVw-2	18	20
Ld	Lamson very fine sandy loam	122	IVw-1	18	20
Le	Lamson mucky very fine sandy loam	122	IVw-4	18	21
LgB	Lansing silt loam, 3 to 8 percent slopes	122	IIe-1	13	3
LgC	Lansing silt loam, 8 to 15 percent slopes	123	IIIe-1	14	3
LgD	Lansing silt loam, 15 to 25 percent slopes	123	IVe-2	17	3
LmA	Lima silt loam, 0 to 3 percent slopes	123	IIw-2	14	5
LmB	Lima silt loam, 3 to 8 percent slopes	123	IIe-4	13	5
LnA	Lima silt loam, moderately deep variant, 0 to 3 percent slopes	123	IIIs-5	17	5
LnB	Lima silt loam, moderately deep variant, 3 to 8 percent slopes	124	IIIs-5	17	5
LoA	Lyons and Appleton silt loams, 0 to 3 percent slopes	124	IVw-1	18	20
LpA	Lyons and Kendaia silt loams, 0 to 3 percent slopes	124	IVw-1	18	20
Ma	Madalin silty clay loam	125	IVw-2	18	20
Md	Made land, tillable	125	IIIs-3	17	22
Me	Made land and Dumps	125	VIIIs-2	20	22
MhA	Manheim silt loam, 0 to 3 percent slopes	126	IIIw-2	16	15
MhB	Manheim silt loam, 3 to 8 percent slopes	126	IIIw-5	16	15
MlB	Manlius very shaly silt loam, 3 to 8 percent slopes	126	IIs-1	14	11
MlC	Manlius very shaly silt loam, 8 to 15 percent slopes	126	IIIe-7	15	11
MlD	Manlius very shaly silt loam, 15 to 25 percent slopes	126	IVe-4	18	11
MlE	Manlius very shaly silt loam, 25 to 40 percent slopes	127	VIe-1	19	12
MmA	Marilla shaly silt loam, 0 to 3 percent slopes	127	IIw-2	14	13
MmB	Marilla shaly silt loam, 3 to 8 percent slopes	127	IIe-4	13	13
MmC	Marilla shaly silt loam, 8 to 15 percent slopes	127	IIIe-6	15	13
Mn	Middlebury silt loam	128	IIIw-6	16	6
MoB	Mohawk silt loam, 2 to 8 percent slopes	129	IIe-1	13	5
MoC	Mohawk silt loam, 8 to 15 percent slopes	129	IIIe-1	14	5
MoD	Mohawk silt loam, 15 to 25 percent slopes	129	IVe-2	17	5
MpB	Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes	129	IIe-1	13	5
MpC	Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes	129	IIIe-1	14	5
MpD	Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes	129	IVe-4	18	5
Mr	Muck, deep	129	IIIw-7	16	21
Ms	Muck, shallow	130	IVw-5	18	21
NaA	Niagara and Collamer silt loams, 0 to 2 percent slopes	131	IIIw-2	16	10
NuB	Nunda silt loam, 3 to 8 percent slopes	131	IIe-6	14	8
NuC	Nunda silt loam, 8 to 15 percent slopes	131	IIIe-4	15	8
NuD	Nunda silt loam, 15 to 25 percent slopes	132	IVe-3	17	8
OdA	Odessa silt loam, 0 to 2 percent slopes	132	IIIw-1	16	16
OdB	Odessa silt loam, 2 to 6 percent slopes	132	IIIw-4	16	16

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group
			Symbol	Page	Number
OnA	Ontario loam, 0 to 3 percent slopes	133	I-2	12	3
OnB	Ontario loam, 3 to 8 percent slopes	133	IIe-1	13	3
OnC	Ontario loam, 8 to 15 percent slopes	133	IIIe-1	14	3
OnD	Ontario loam, 15 to 25 percent slopes	133	IVe-2	17	3
OrE	Ontario and Lansing soils, 25 to 40 percent slopes	133	VIe-1	19	4
OsB	Ontario stony loam, 2 to 8 percent slopes	133	IIIs-4	17	3
OsC	Ontario stony loam, 8 to 15 percent slopes	134	VIs-1	19	3
OvA	Ovid silt loam, 0 to 3 percent slopes	134	IIIw-1	16	16
OvB	Ovid silt loam, 3 to 8 percent slopes	134	IIIw-4	16	16
PaA	Palmyra gravelly loam, 0 to 3 percent slopes	135	I-2	12	1
PaB	Palmyra gravelly loam, 3 to 8 percent slopes	135	IIe-2	13	1
PaC	Palmyra gravelly loam, 8 to 15 percent slopes	135	IIIe-2	14	1
PkD	Palmyra and Arkport soils, 15 to 25 percent slopes	135	IVe-1	17	1
PkE	Palmyra and Arkport soils, 25 to 40 percent slopes	135	VIe-1	19	2
PlA	Palmyra shaly silt loam, 0 to 3 percent slopes	135	I-2	12	1
PlB	Palmyra shaly silt loam, 3 to 8 percent slopes	136	IIe-2	13	1
PlC	Palmyra shaly silt loam, 8 to 15 percent slopes	136	IIIe-2	14	1
PrA	Phelps and Fredon gravelly loams, 0 to 3 percent slopes	136	IIw-1	14	10
PsB	Phelps gravelly loam, 3 to 8 percent slopes	136	IIe-4	13	1
ReA	Remsen silt loam, 0 to 3 percent slopes	137	IIIw-1	16	16
ReB	Remsen silt loam, 3 to 8 percent slopes	137	IIIw-4	16	16
ReC	Remsen silt loam, 8 to 15 percent slopes	137	IIIe-5	15	16
RmB3	Remsen silty clay loam, 3 to 8 percent slopes, eroded	137	IIIe-8	15	16
RmC3	Remsen silty clay loam, 8 to 15 percent slopes, eroded	137	IVe-5	18	16
RmC4	Remsen silty clay loam, 8 to 25 percent slopes, severely eroded	138	VIIe-2	19	22
RmD3	Remsen silty clay loam, 15 to 25 percent slopes, eroded	138	VIe-2	19	16
RnE	Remsen soils, 25 to 40 percent slopes	138	VIIe-1	19	9
RnE4	Remsen soils, 25 to 40 percent slopes, severely eroded	138	VIIe-2	19	22
Ro	Rhinebeck silt loam	138	IIIw-1	16	16
Rr	Rockland, limestone	139	VIIIs-1	20	22
Rs	Romulus silt loam	139	IVw-2	18	20
SeB	Schoharie silt loam, 1 to 6 percent slopes	140	IIe-6	14	8
ShC3	Schoharie silty clay loam, 6 to 12 percent slopes, eroded	140	IVe-5	18	8
ShD3	Schoharie silty clay loam, 12 to 20 percent slopes, eroded	140	VIe-2	19	8
SlE3	Schoharie soils, 20 to 40 percent slopes, eroded	140	VIIe-1	19	9
SmB	Scio silt loam, 2 to 8 percent slopes	141	IIe-5	13	6
Sn	Sloan silt loam	141	VIIw-1	19	21
StA	Stafford loamy fine sand, 0 to 2 percent slopes	141	IIIw-3	16	14
Wa	Wayland silt loam	142	IVw-3	18	20
Wr	Warners loam	142	VIIw-2	20	21

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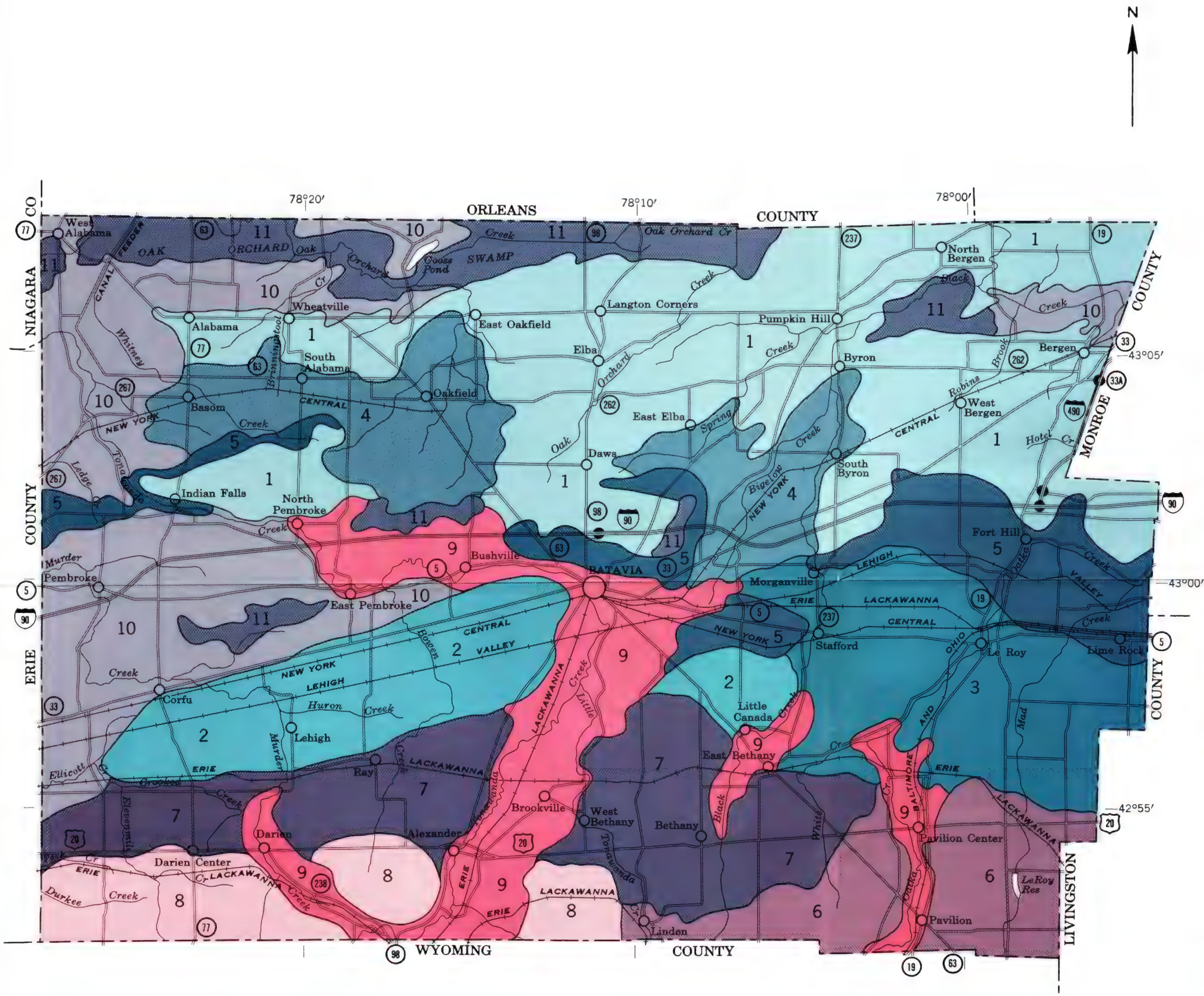
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
GENESEE COUNTY, NEW YORK

SCALE IN MILES

1 0 1 2 3 4



SOIL ASSOCIATIONS

AREAS DOMINATED BY HIGH-LIME SOILS DEVELOPED ON GLACIAL TILL

1 Ontario-Hilton association: Deep, well drained and moderately well drained soils having a medium-textured subsoil

2 Mohawk-Manheim association: Deep, well-drained to somewhat poorly drained soils having a medium-textured subsoil, from shaly till

3 Lima-Kendaia association: Deep, moderately well drained and somewhat poorly drained soils having a medium-textured subsoil

4 Cazenovia-Ovid association: Deep, well-drained to somewhat poorly drained soils having a moderately fine textured subsoil

5 Benson-Honeoye, moderately deep, association: Shallow and moderately deep, well-drained soils having a medium-textured subsoil, over limestone bedrock

AREAS DOMINATED BY MEDIUM-LIME SOILS DEVELOPED ON GLACIAL TILL

6 Lansing-Conesus association: Deep, well drained and moderately well drained soils having a medium-textured subsoil

7 Remsen-Darien association: Deep, somewhat poorly drained soils having a fine textured and moderately fine textured subsoil

AREAS DOMINATED BY LOW-LIME SOILS DEVELOPED ON GLACIAL TILL

8 Fremont-Hornell-Manlius association: Deep and moderately deep, well-drained to somewhat poorly drained soils having a medium-textured and fine-textured subsoil, from shaly till

AREAS DOMINATED BY SOILS DEVELOPED ON GLACIAL OUTWASH TERRACES AND KAMES

9 Palmyra association: Deep, well-drained, high-lime soils having a medium-textured subsoil, over sand and gravel

AREAS DOMINATED BY SOILS DEVELOPED ON GLACIAL LAKE SEDIMENTS

10 Collamer-Galen-Canandaigua-Lamson association: Deep, moderately well drained to poorly drained, medium and high-lime soils having a moderately coarse textured and medium-textured subsoil

AREAS DOMINATED BY SOILS DEVELOPED ON ORGANIC MATERIAL

11 Muck association: Deep to shallow, very poorly drained organic soils

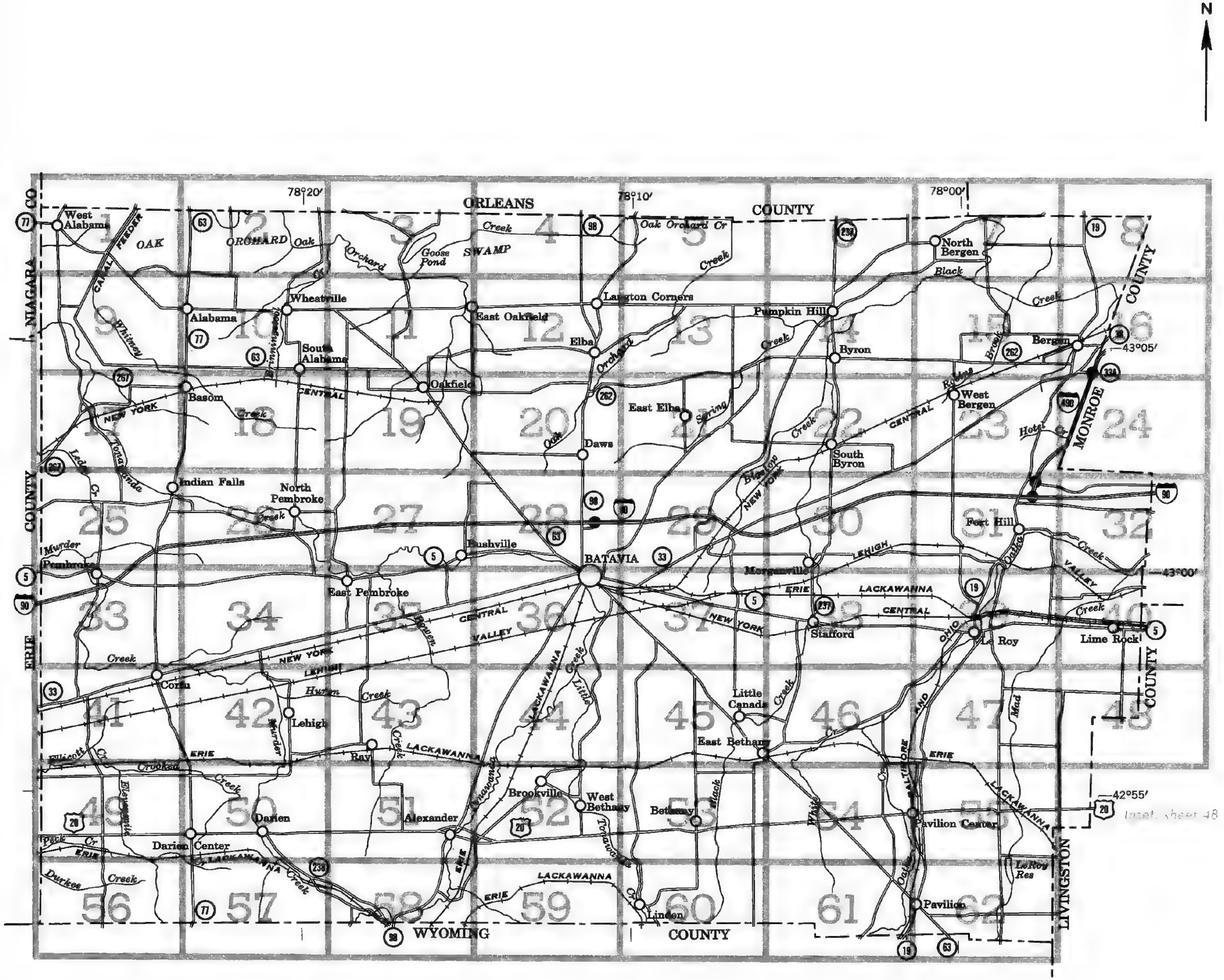
January 1968

INDEX TO MAP SHEETS

GENESEE COUNTY, NEW YORK

SCALE IN MILES

1 0 1 2 3 4



SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, is a general guide to the slope class. Symbols without a slope letter are for those miscellaneous land types or soils where slope is not significant to use and management. A final number, 3 or 4, in the symbol shows that the soil is eroded or severely eroded.

SYMBOL	NAME
Ad	Alden mucky silt loam
AeA	Allis silty clay loam, deep, 0 to 4 percent slopes
Al	Alluvial land
AnA	Angola silt loam, 0 to 3 percent slopes
AnB	Angola silt loam, 3 to 8 percent slopes
ApB	Appleton silt loam, 3 to 8 percent slopes
ArB	Arkport very fine sandy loam, 1 to 6 percent slopes
ArC	Arkport very fine sandy loam, 6 to 12 percent slopes
AsD	Arkport and Dunkirk soils, 12 to 20 percent slopes
AsE	Arkport and Dunkirk soils, 20 to 40 percent slopes
BeB	Benson soils, 0 to 8 percent slopes
BeD	Benson soils, 8 to 25 percent slopes
BeE	Benson soils, 25 to 40 percent slopes
BuA	Burdett silt loam, 0 to 3 percent slopes
BuB	Burdett silt loam, 3 to 8 percent slopes
CaA	Canandaigua silt loam, 0 to 2 percent slopes
CdA	Canandaigua mucky silt loam, 0 to 2 percent slopes
CeA	Cazenovia silt loam, 0 to 3 percent slopes
CeB	Cazenovia silt loam, 3 to 8 percent slopes
CeC	Cazenovia silt loam, 8 to 15 percent slopes
CgC3	Cazenovia silty clay loam, 8 to 15 percent slopes, eroded
CgD3	Cazenovia silty clay loam, 15 to 25 percent slopes, eroded
ChA	Chenango shaly silt loam, 0 to 3 percent slopes
ChB	Chenango shaly silt loam, 3 to 8 percent slopes
ChC	Chenango shaly silt loam, 8 to 15 percent slopes
ClB	Collamer silt loam, 2 to 6 percent slopes
CmB	Colonie loamy fine sand, 2 to 6 percent slopes
CmC	Colonie loamy fine sand, 6 to 12 percent slopes
CoA	Conesus silt loam, 0 to 3 percent slopes
CoB	Conesus silt loam, 3 to 8 percent slopes
CoC	Conesus silt loam, 8 to 15 percent slopes
DaA	Darien silt loam, 0 to 3 percent slopes
DaB	Darien silt loam, 3 to 8 percent slopes
DaC	Darien silt loam, 8 to 15 percent slopes
DaD	Darien silt loam, 15 to 25 percent slopes
DuB	Dunkirk silt loam, 2 to 6 percent slopes
DuC	Dunkirk silt loam, 6 to 12 percent slopes
Ed	Edwards muck
Ee	Eel silt loam
ElB	Elnora loamy fine sand, 2 to 6 percent slopes
Fo	Fonda mucky silt loam
FrA	Fremont silt loam, 0 to 3 percent slopes
FrB	Fremont silt loam, 3 to 8 percent slopes
FrC	Fremont silt loam, 8 to 15 percent slopes
Fw	Fresh water marsh
GmA	Galen and Minoa very fine sandy loams, 0 to 2 percent slopes
GnB	Galen very fine sandy loam, 2 to 6 percent slopes
Gs	Genesee silt loam

SYMBOL	NAME
HaA	Halsey silt loam, 0 to 4 percent slopes
HlA	Hilton loam, 0 to 3 percent slopes
HlB	Hilton loam, 3 to 8 percent slopes
Hm	Holly silt loam
HnB	Honeoye silt loam, moderately deep variant, 2 to 8 percent slopes
HoB3	Hornell silty clay loam, 3 to 8 percent slopes, eroded
HoC3	Hornell silty clay loam, 8 to 15 percent slopes, eroded
HsD3	Hornell and Fremont soils, 15 to 25 percent slopes, eroded
IoA	Ilion silt loam, 0 to 3 percent slopes
IoB	Ilion silt loam, 3 to 8 percent slopes
KeA	Kendaia silt loam, moderately deep variant, 0 to 4 percent slopes
La	Lakemont silty clay loam
Ld	Lamson very fine sandy loam
Le	Lamson mucky very fine sandy loam
LgB	Lansing silt loam, 3 to 8 percent slopes
LgC	Lansing silt loam, 8 to 15 percent slopes
LgD	Lansing silt loam, 15 to 25 percent slopes
LmA	Lima silt loam, 0 to 3 percent slopes
LmB	Lima silt loam, 3 to 8 percent slopes
LnA	Lima silt loam, moderately deep variant, 0 to 3 percent slopes
LnB	Lima silt loam, moderately deep variant, 3 to 8 percent slopes
LoA	Lyons and Appleton silt loams, 0 to 3 percent slopes
LpA	Lyons and Kendaia silt loams, 0 to 3 percent slopes
Ma	Madalin silty clay loam
Md	Made land, tillable
Me	Made land and Dumps
MhA	Manheim silt loam, 0 to 3 percent slopes
MhB	Manheim silt loam, 3 to 8 percent slopes
MlB	Manlius very shaly silt loam, 3 to 8 percent slopes
MlC	Manlius very shaly silt loam, 8 to 15 percent slopes
MlD	Manlius very shaly silt loam, 15 to 25 percent slopes
MlE	Manlius very shaly silt loam, 25 to 40 percent slopes
MmA	Marilla shaly silt loam, 0 to 3 percent slopes
MmB	Marilla shaly silt loam, 3 to 8 percent slopes
MmC	Marilla shaly silt loam, 8 to 15 percent slopes
Mn	Middlebury silt loam
MoB	Mohawk silt loam, 2 to 8 percent slopes
MoC	Mohawk silt loam, 8 to 15 percent slopes
MoD	Mohawk silt loam, 15 to 25 percent slopes
MpB	Mohawk shaly silt loam, moderately deep variant, 2 to 8 percent slopes
MpC	Mohawk shaly silt loam, moderately deep variant, 8 to 15 percent slopes
MpD	Mohawk shaly silt loam, moderately deep variant, 15 to 25 percent slopes
Mr	Muck, deep
Ms	Muck, shallow

SYMBOL	NAME
NaA	Niagara and Collamer silt loams, 0 to 2 percent slopes
NuB	Nunda silt loam, 3 to 8 percent slopes
NuC	Nunda silt loam, 8 to 15 percent slopes
NuD	Nunda silt loam, 15 to 25 percent slopes
OdA	Odessa silt loam, 0 to 2 percent slopes
OdB	Odessa silt loam, 2 to 6 percent slopes
OnA	Ontario loam, 0 to 3 percent slopes
OnB	Ontario loam, 3 to 8 percent slopes
OnC	Ontario loam, 8 to 15 percent slopes
OnD	Ontario loam, 15 to 25 percent slopes
OrE	Ontario and Lansing soils, 25 to 40 percent slopes
OsB	Ontario stony loam, 2 to 8 percent slopes
OsC	Ontario stony loam, 8 to 15 percent slopes
OvA	Ovid silt loam, 0 to 3 percent slopes
OvB	Ovid silt loam, 3 to 8 percent slopes
PaA	Palmyra gravelly loam, 0 to 3 percent slopes
PaB	Palmyra gravelly loam, 3 to 8 percent slopes
PaC	Palmyra gravelly loam, 8 to 15 percent slopes
PkD	Palmyra and Arkport soils, 15 to 25 percent slopes
PkE	Palmyra and Arkport soils, 25 to 40 percent slopes
PlA	Palmyra shaly silt loam, 0 to 3 percent slopes
PlB	Palmyra shaly silt loam, 3 to 8 percent slopes
PlC	Palmyra shaly silt loam, 8 to 15 percent slopes
PrA	Phelps and Fredon gravelly loams, 0 to 3 percent slopes
PsB	Phelps gravelly loam, 3 to 8 percent slopes
ReA	Remsen silt loam, 0 to 3 percent slopes
ReB	Remsen silt loam, 3 to 8 percent slopes
ReC	Remsen silt loam, 8 to 15 percent slopes
RmB3	Remsen silty clay loam, 3 to 8 percent slopes, eroded
RmC3	Remsen silty clay loam, 8 to 15 percent slopes, eroded
RmC4	Remsen silty clay loam, 8 to 25 percent slopes, severely eroded
RmD3	Remsen silty clay loam, 15 to 25 percent slopes, eroded
RnE	Remsen soils, 25 to 40 percent slopes
RnE4	Remsen soils, 25 to 40 percent slopes, severely eroded
Ro	Rhinebeck silt loam
Rr	Rockland, limestone
Rs	Romulus silt loam
SeB	Schoharie silt loam, 1 to 6 percent slopes
ShC3	Schoharie silty clay loam, 6 to 12 percent slopes, eroded
ShD3	Schoharie silty clay loam, 12 to 20 percent slopes, eroded
SlE3	Schoharie soils, 20 to 40 percent slopes, eroded
SmB	Scio silt loam, 2 to 8 percent slopes
Sn	Sloan silt loam
StA	Stafford loamy fine sand, 0 to 2 percent slopes
Wa	Wayland silt loam
Wr	Warners loam

Soil map constructed 1967 by Cartographic Division, Soil Conservation Service, USDA, from 1963 aerial photographs. Controlled mosaic based on New York plane coordinate system, west zone, transverse Mercator projection, 1927 North American datum.

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

2

N

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 10)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 2

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

4

N

(Joins sheet 3)

(Joins sheet 5)

(Joins sheet 12)

½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK NO. 5

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

6

N

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 14)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 6

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK NO. 7

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

8

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 8

This map is one of a set compiled in 1957 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

Scale 1:15 840 — 1 Mile — 5000 Feet

GENESEE COUNTY, NEW YORK — SHEET NUMBER 10

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO.10

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 3)

11

N

(Joins sheet 10)

(Joins sheet 12)

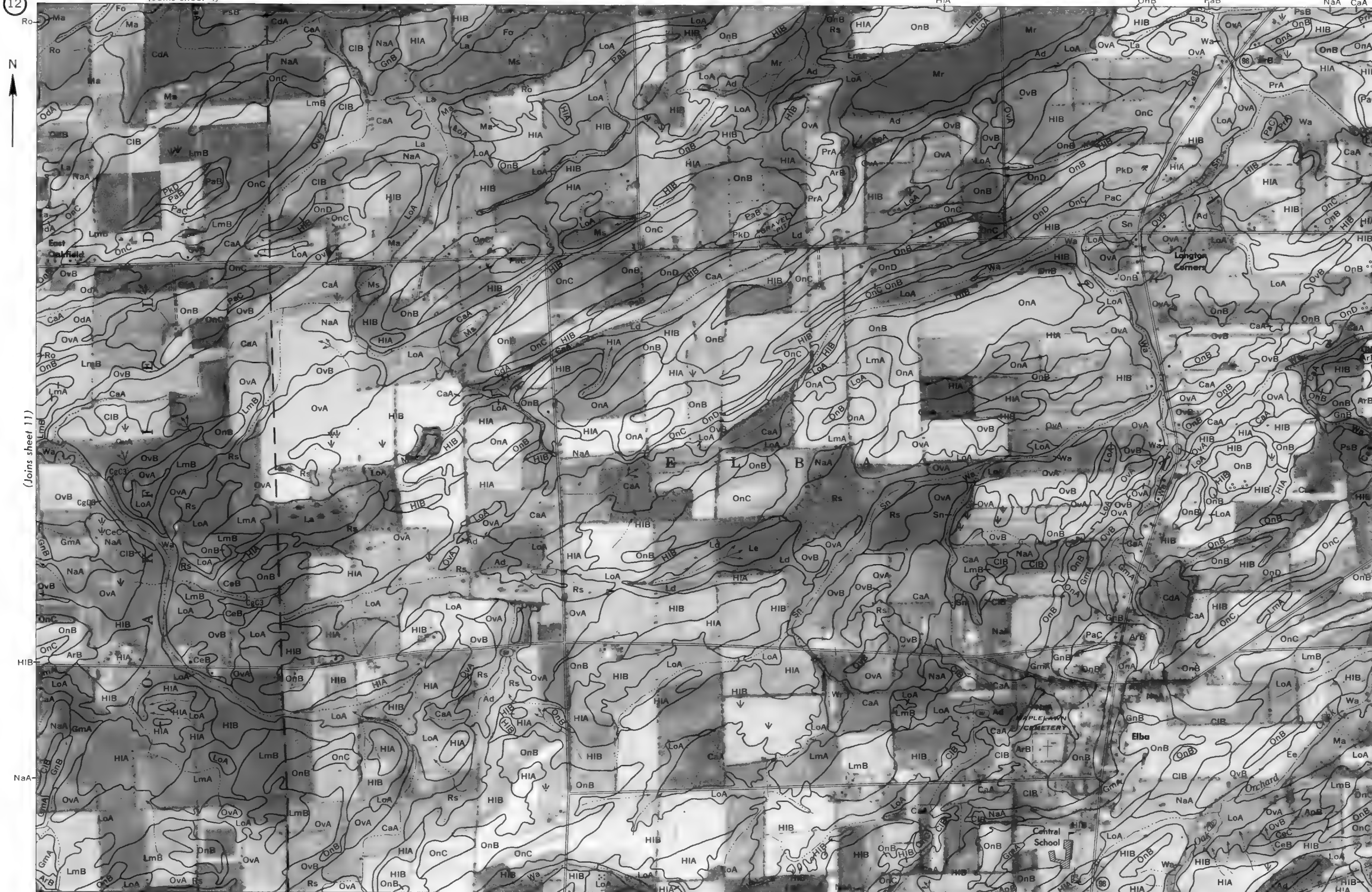
(Joins sheet 19)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK — SHEET NUMBER 12

12

(Joins sheet 4)



(Joins sheet 20)

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 12

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 5)

13

(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 21)

GENESEE COUNTY, NEW YORK NO. 13

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 6)

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 22)

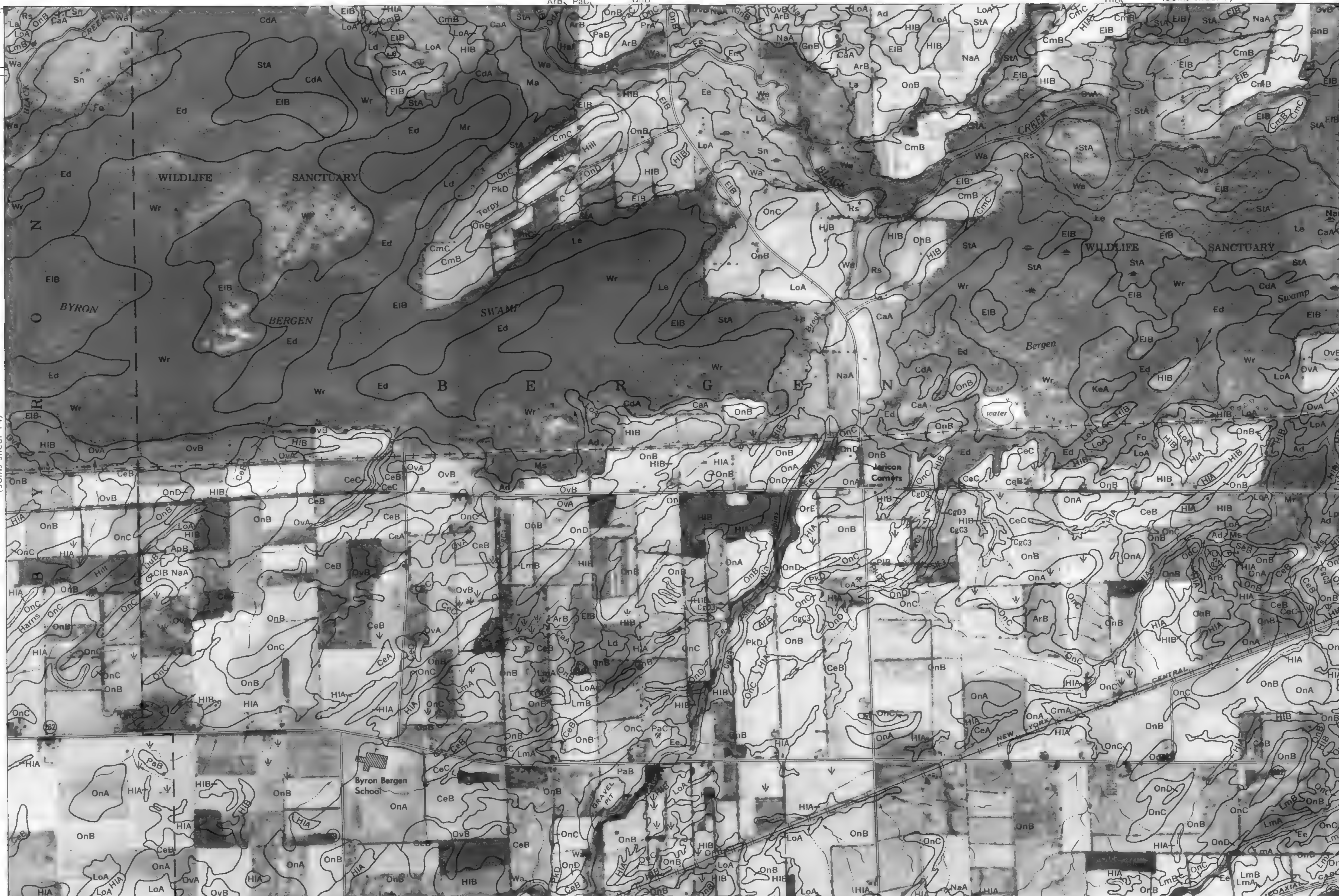
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 14

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(15)

(Joins sheet 7)



(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 23)

0 ½ 1 Mile

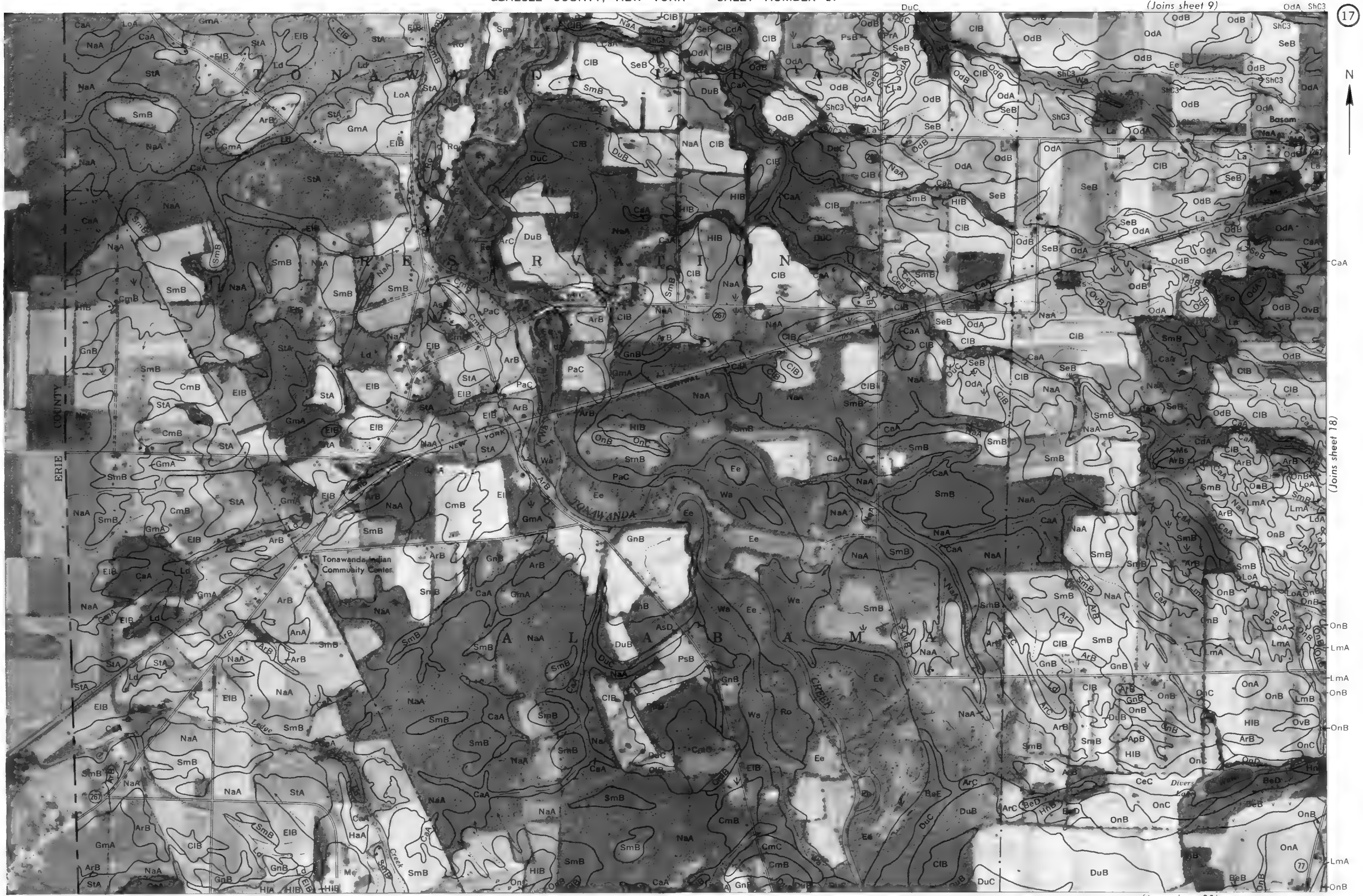
Scale 1:15 840

0 5000 Feet

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 16

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.



0 ½ 1 Mile   Scale 1:15 840   0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

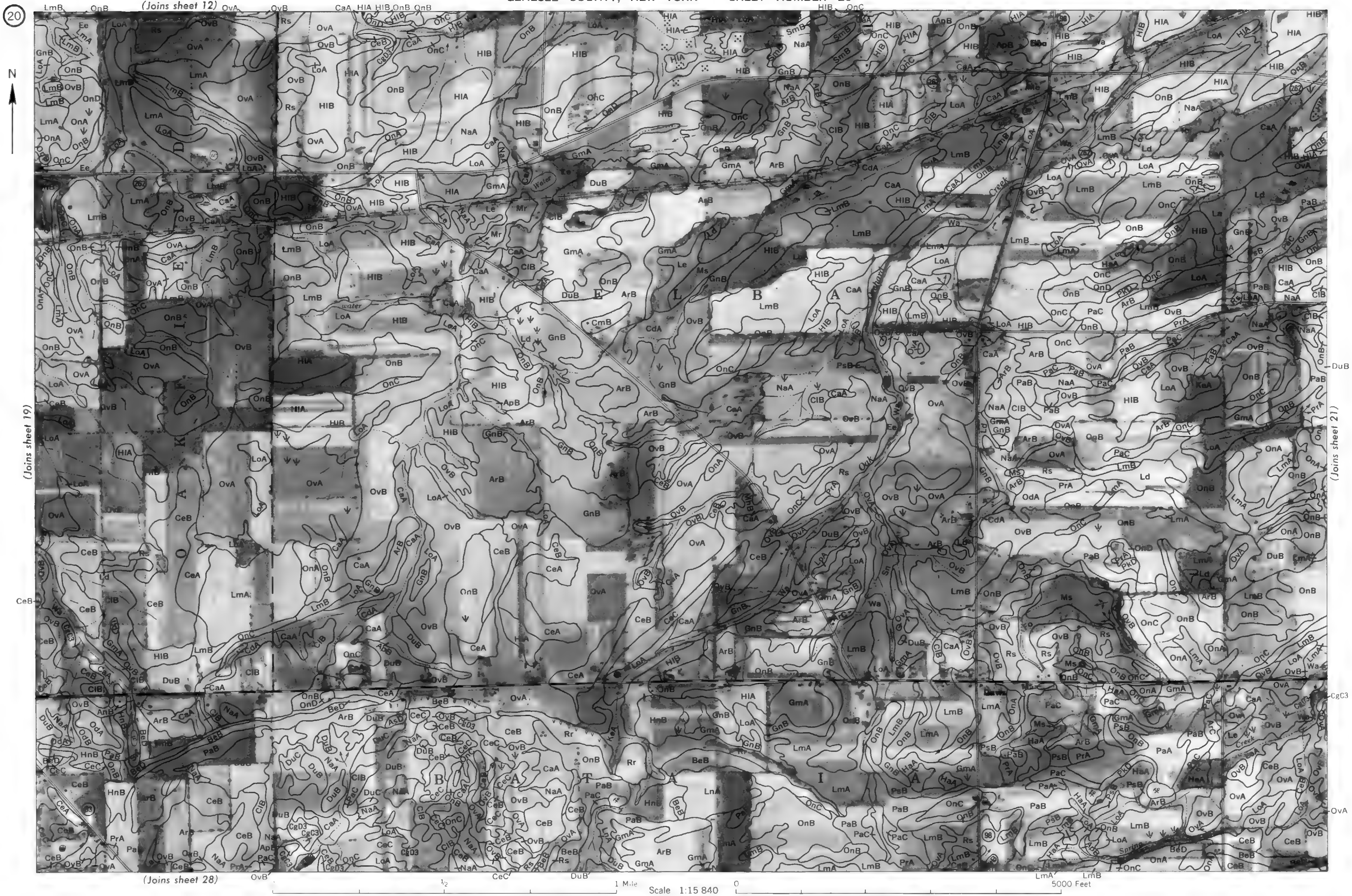
GENESEE COUNTY, NEW YORK NO. 18

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station

GENESEE COUNTY, NEW YORK — SHEET NUMBER 20



GENESEE COUNTY, NEW YORK NO. 20

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 21

(21)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

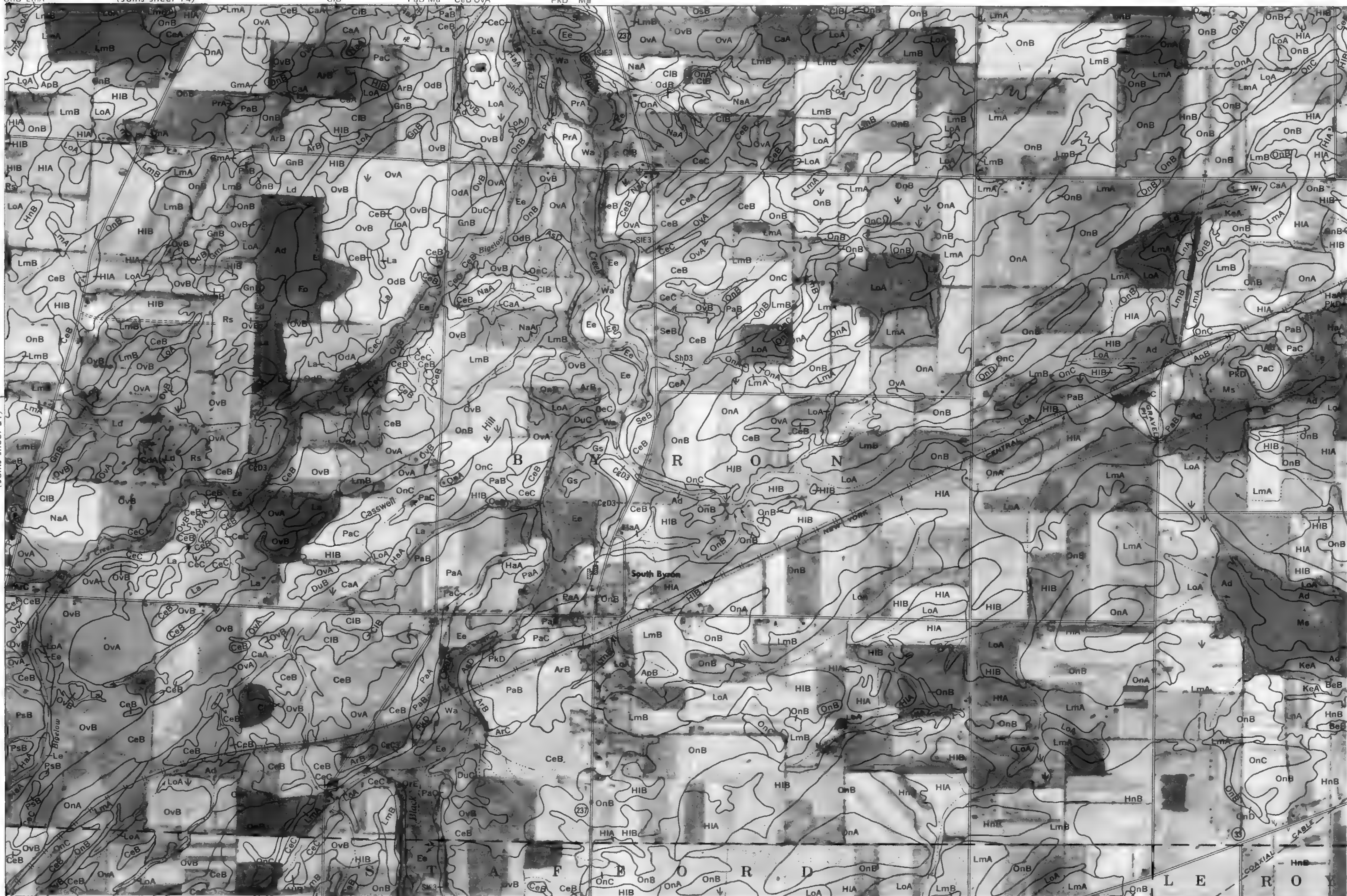
GENESEE COUNTY, NEW YORK NO. 21
This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 22

22

(Joins sheet 14)

(Joins sheet 21)



(Joins sheet 23)

(Joins sheet 30)

Scale 1:15 840

0 ½ 1 Mile

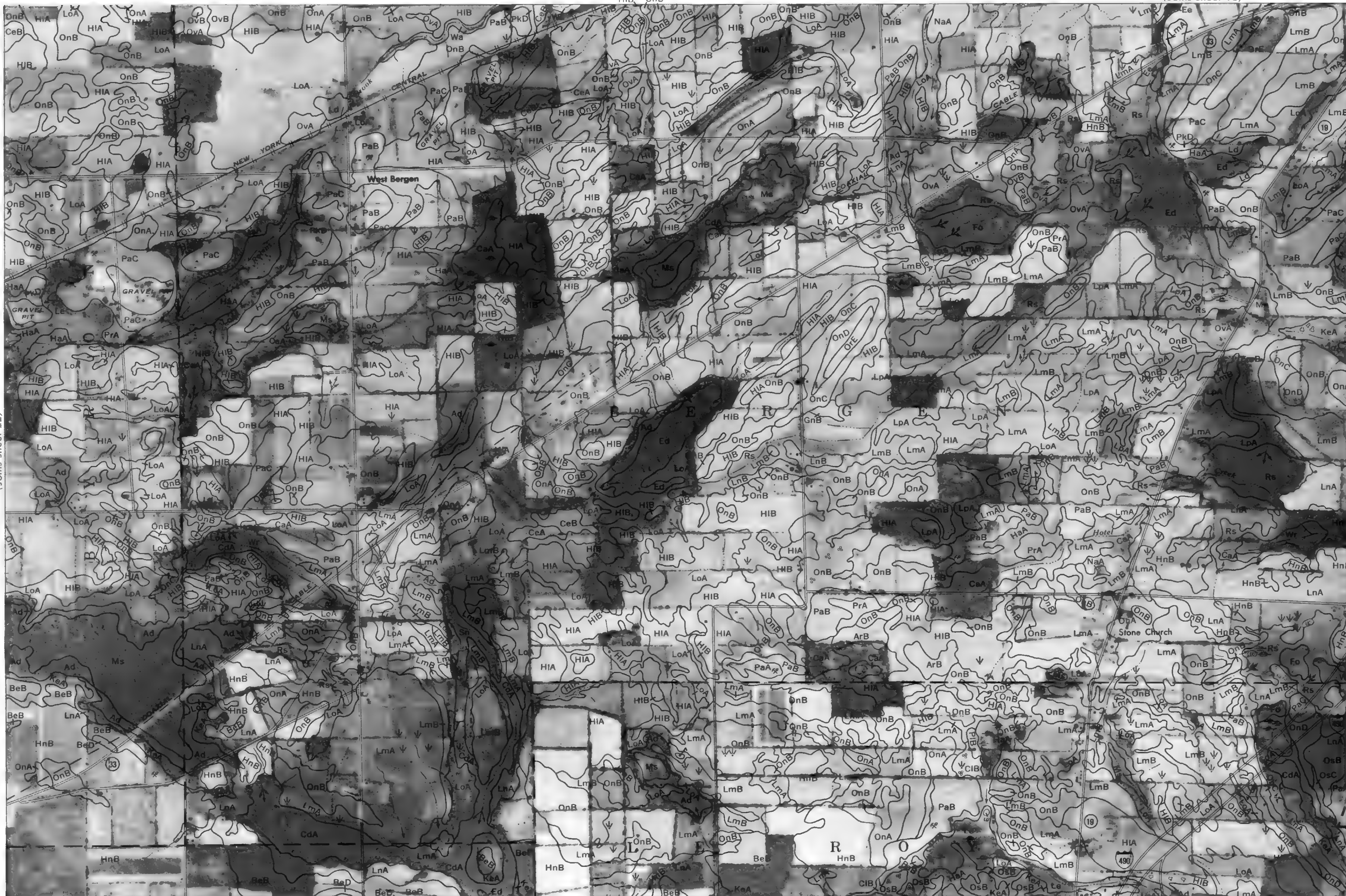
0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 22

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 15)

23



(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 31)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK NO. 23

0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 24

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station

(Joins sheet 17)

25

(Joins sheet 26)

(Joins sheet 33)

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK — SHEET NUMBER 26

(Joins sheet 18)

(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 34)

Scale 1:15 840

1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 26

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station

27

(Joins sheet 19)

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 35)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

28

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

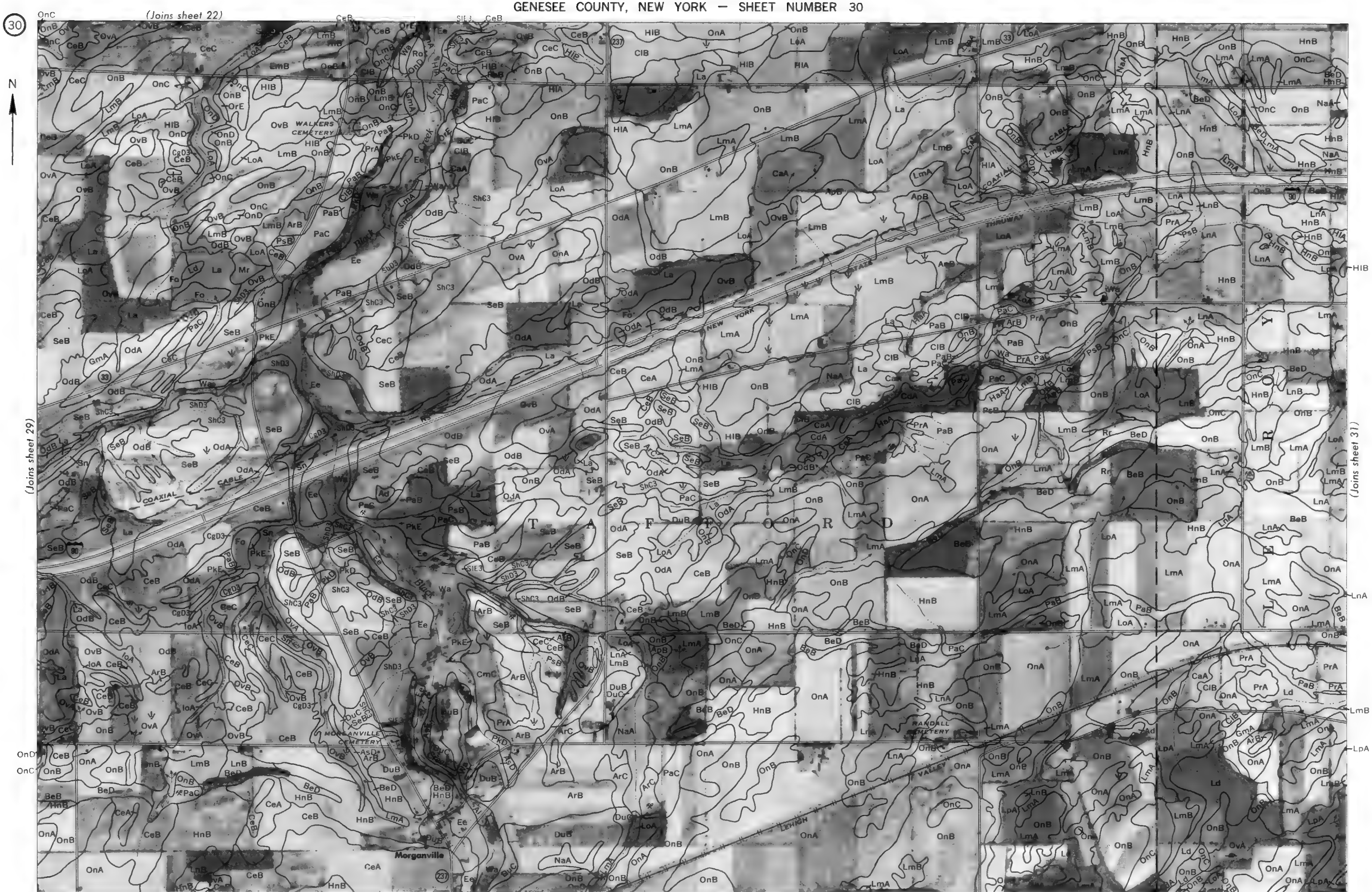
GENESEE COUNTY, NEW YORK NO. 28

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

29

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK — SHEET NUMBER 30



Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 30

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

31

(Joins sheet 23)

(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 39)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 31

32

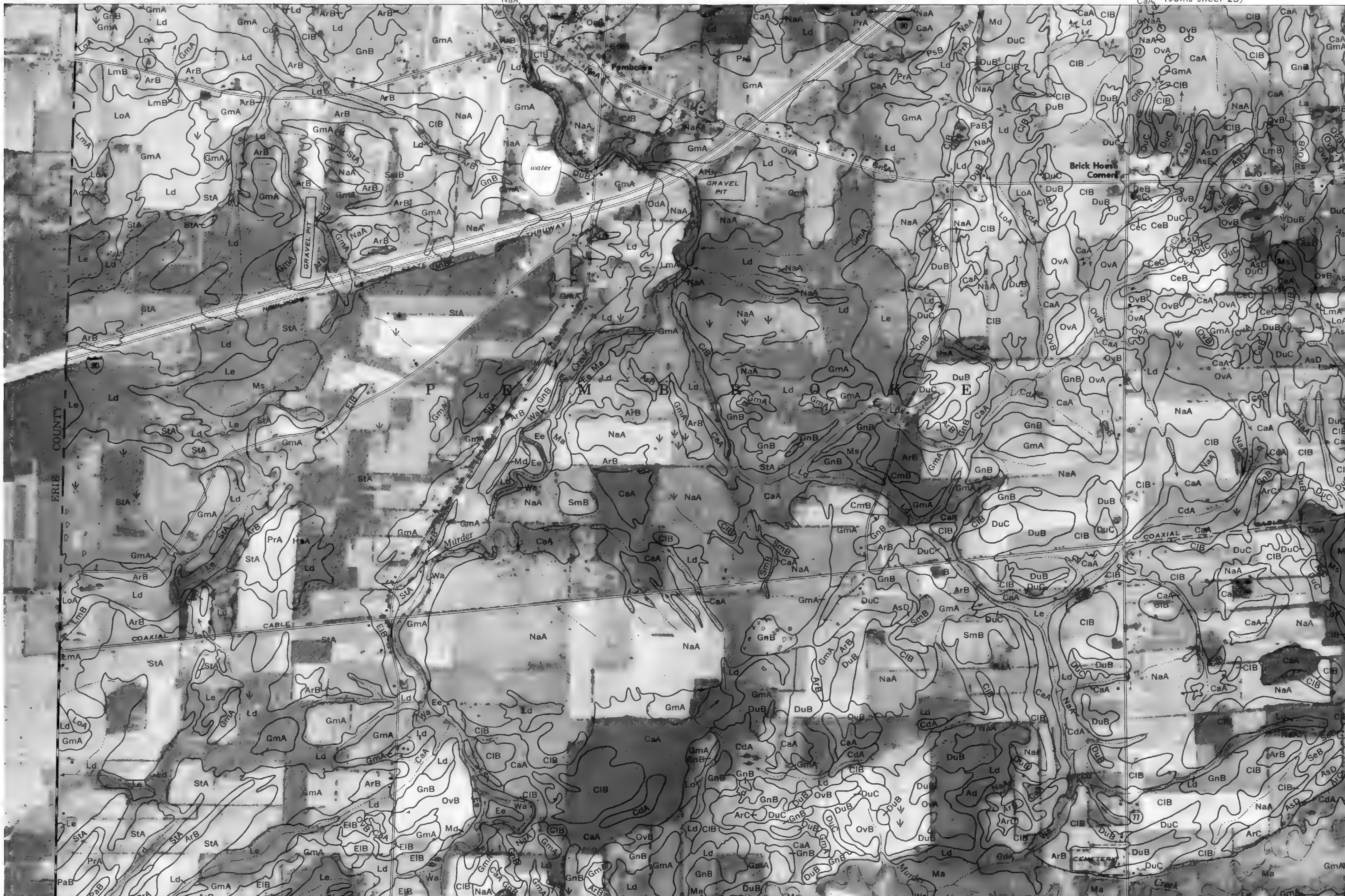
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 32

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station

(Joins sheet 25)

33



(Joins sheet 34)

(Joins sheet 41)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

34

(Joins sheet 26)

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 42)

½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 34

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.


(Joins sheet 27)
35
N
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 43)
TONAWANDA
CREEK
East Pembroke
West Batavia
Nu Lake
BATAVIA
COAXIAL CABLE
NEW YORK CENTRAL
LEHIGH VALLEY
GRAVEL PIT
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

GENESEE COUNTY, NEW YORK — SHEET NUMBER 36

Scale 1:15 840

0 ½ 1 Mile

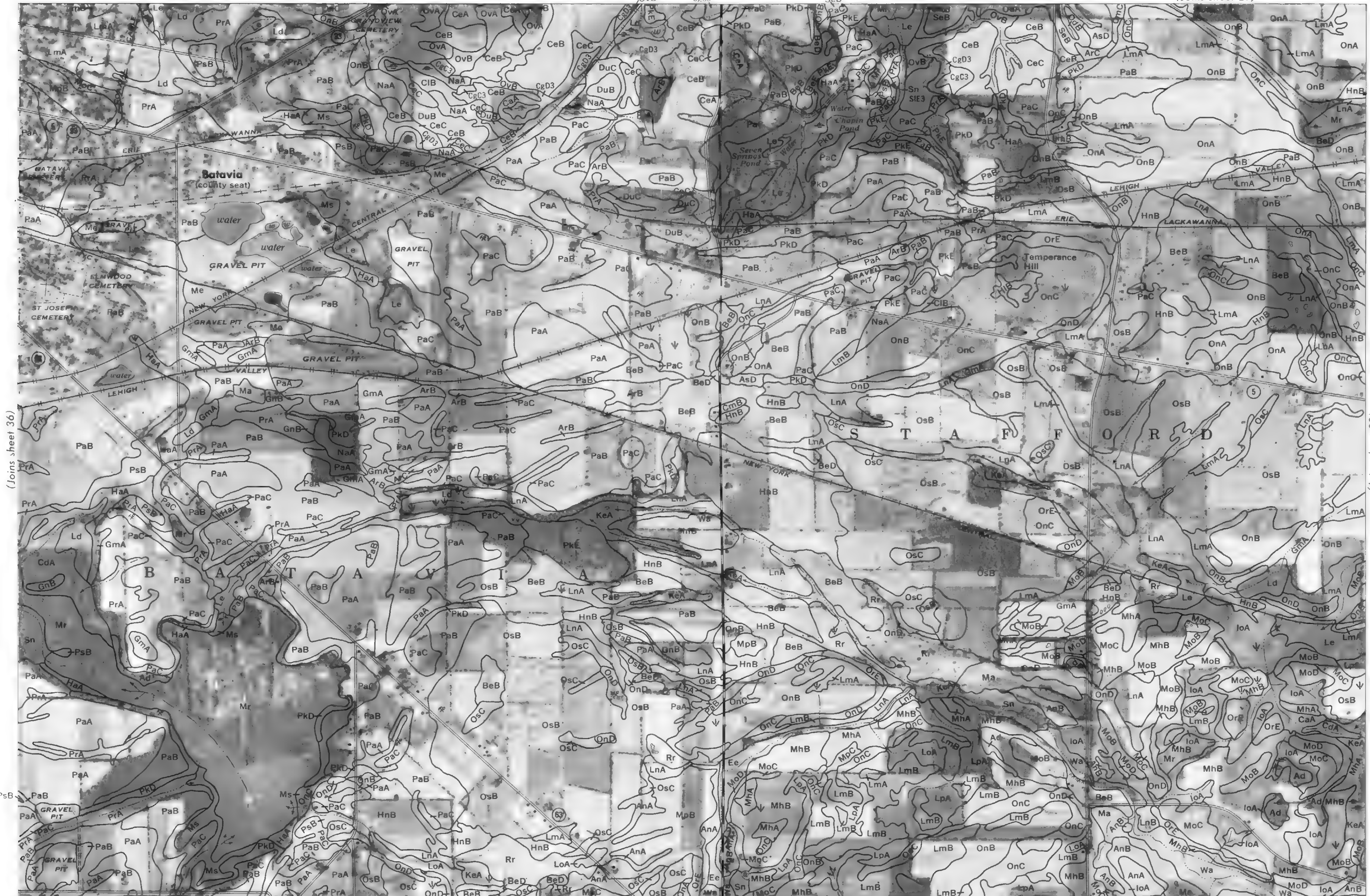
0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 36

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 29)

(Joins sheet 36)



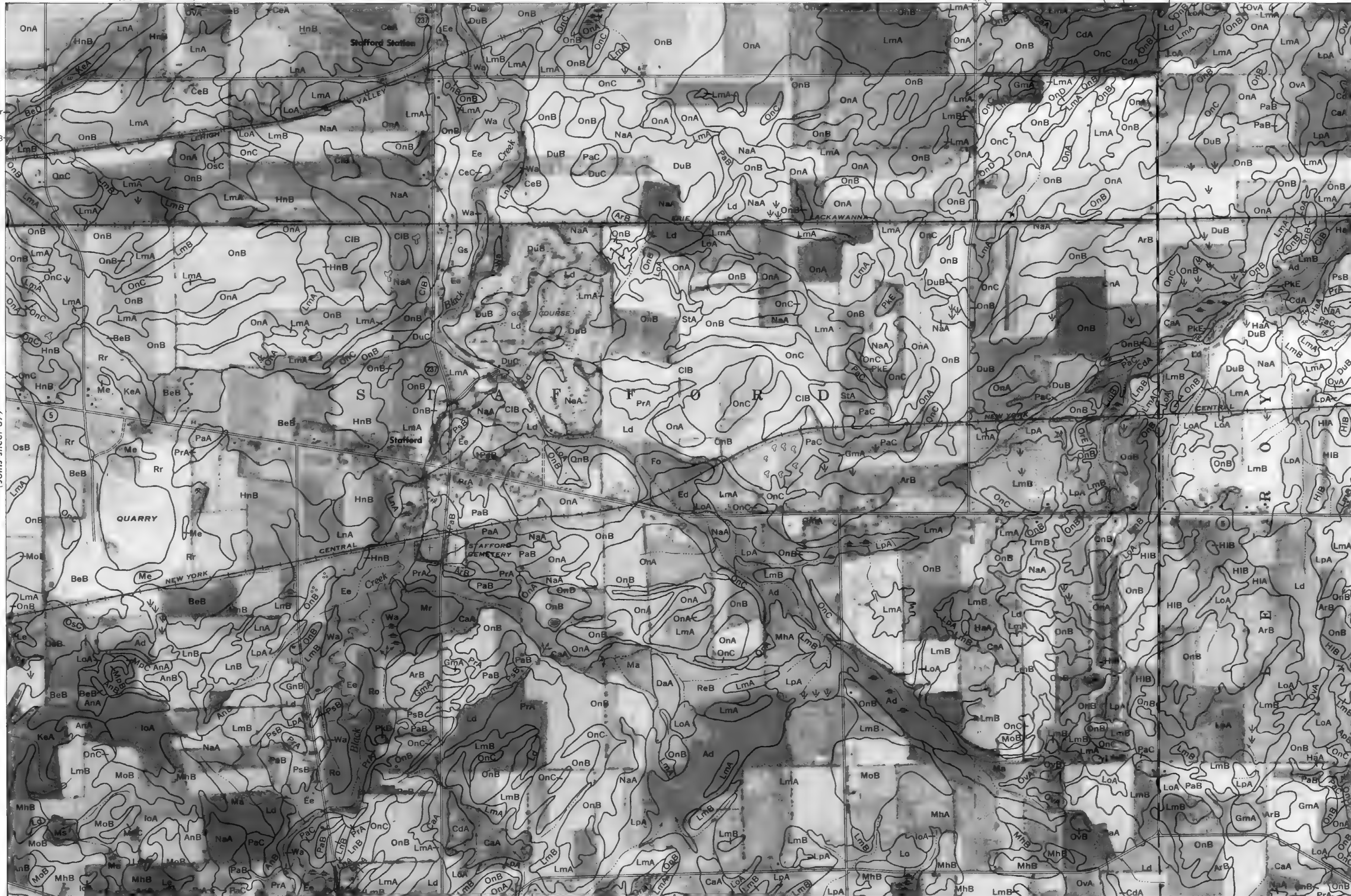
(Joins sheet 38)

(Joins sheet 45)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

38

(Joins sheet 30)



(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 46)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 38

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station

GENESEE COUNTY, NEW YORK NO. 39

(40)

(Joins sheet 32)

(Joins sheet 39)

(Joins sheet 48)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 40

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 33)

41

(Joins sheet 42)

(Joins sheet 49)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

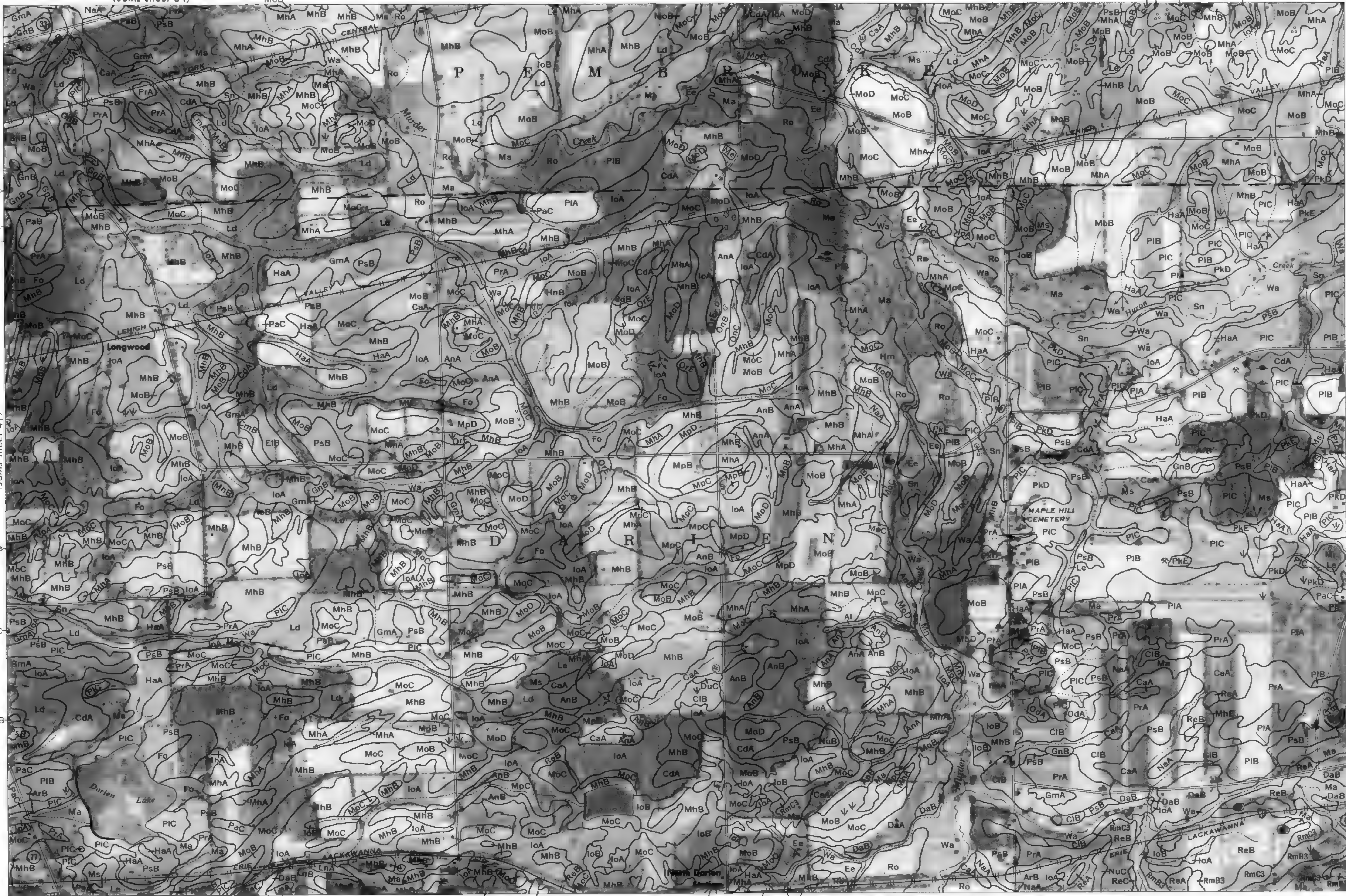
GENESEE COUNTY, NEW YORK NO. 41

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 42

42

(Joins sheet 34)



(Joins sheet 50)

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 42

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK NO 43

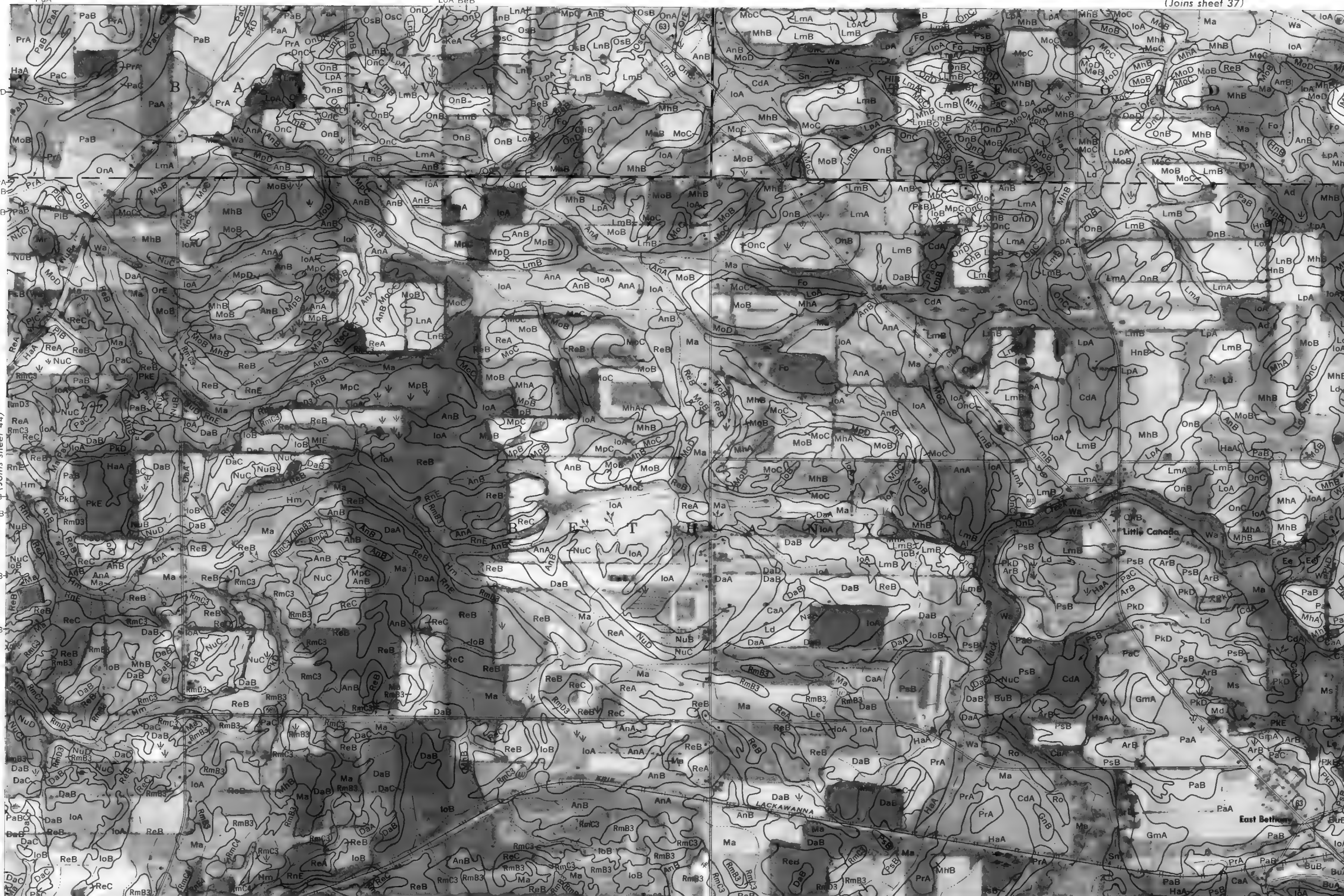
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 44

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 37)

45



(Joins sheet 44)

(Joins sheet 46)

(Joins sheet 53)

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 45

GENESEE COUNTY, NEW YORK NO. 46

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

47

(Joins sheet 39)

(Joins sheet 46)

(Joins sheet 48)

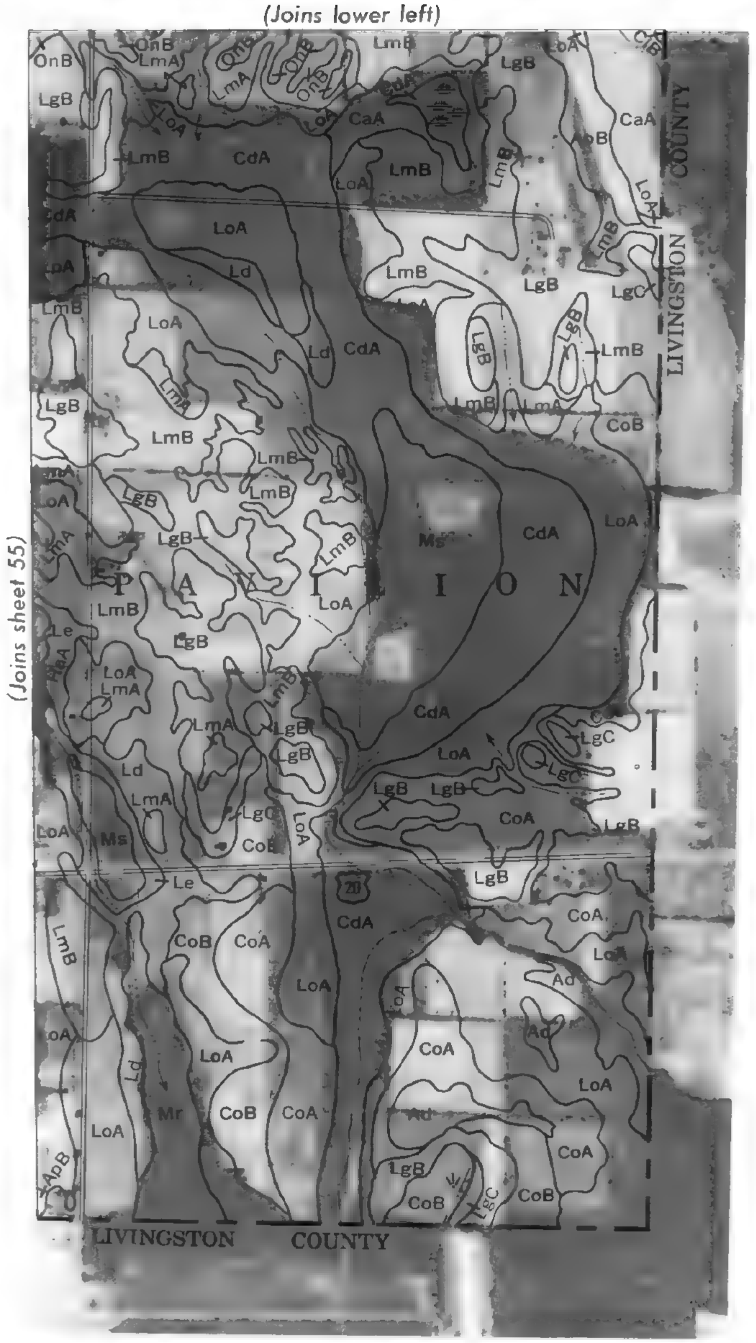
(Joins sheet 55)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

48

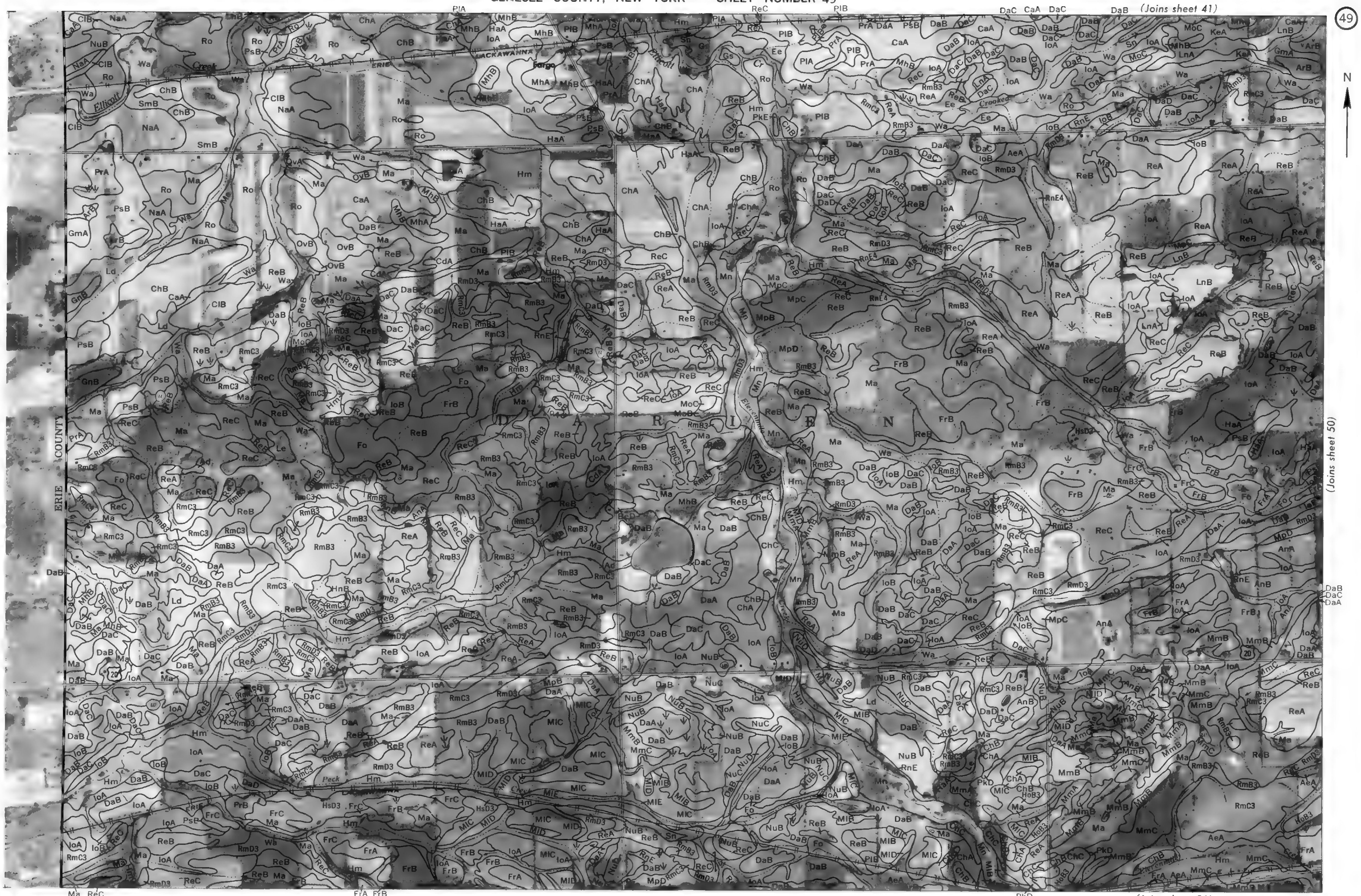


0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 48

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 49



Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.


50
(Joins sheet 42)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 57)
N
North Darien Station
Crooked
DARIEN
Darien Center
LACKAWANNA
ERIE
GENESEE COUNTY, NEW YORK
Scale 1:15 840
1 Mile
0
5000 Feet

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK NO. 51

GENESEE COUNTY, NEW YORK — SHEET NUMBER 52

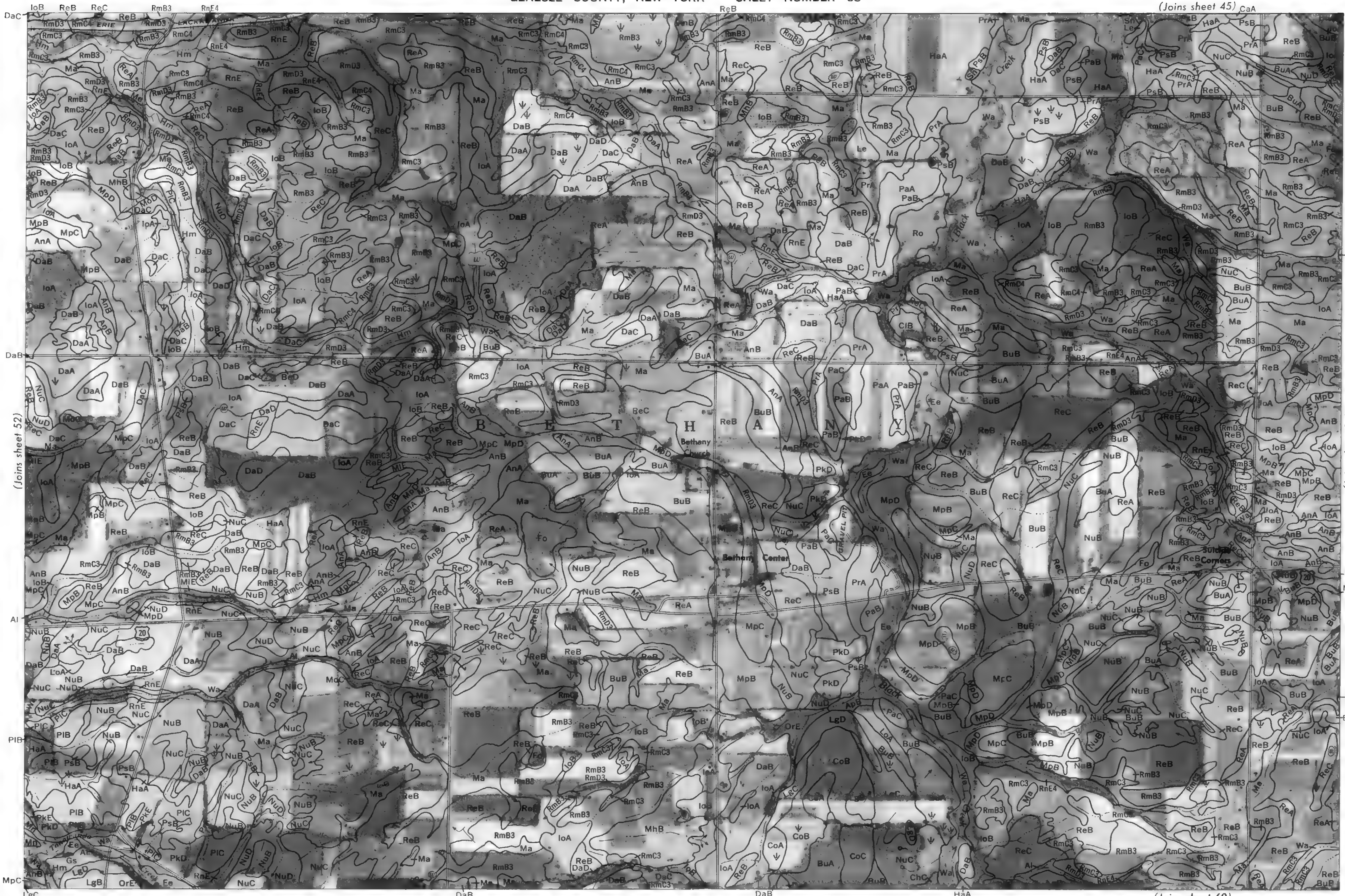
Scale 1:15 840

GENESEE COUNTY, NEW YORK NO. 52

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

53

(Joins sheet 45)



(Joins sheet 60)

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 53

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 54

54

(Joins sheet 46)

(Joins sheet 53)

(Joins sheet 55)

(Joins sheet 61)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 54

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 55

55

(Joins sheet 47)

(Joins sheet 54)

(Joins inset, sheet 48)

(Joins sheet 62)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK NO. 55

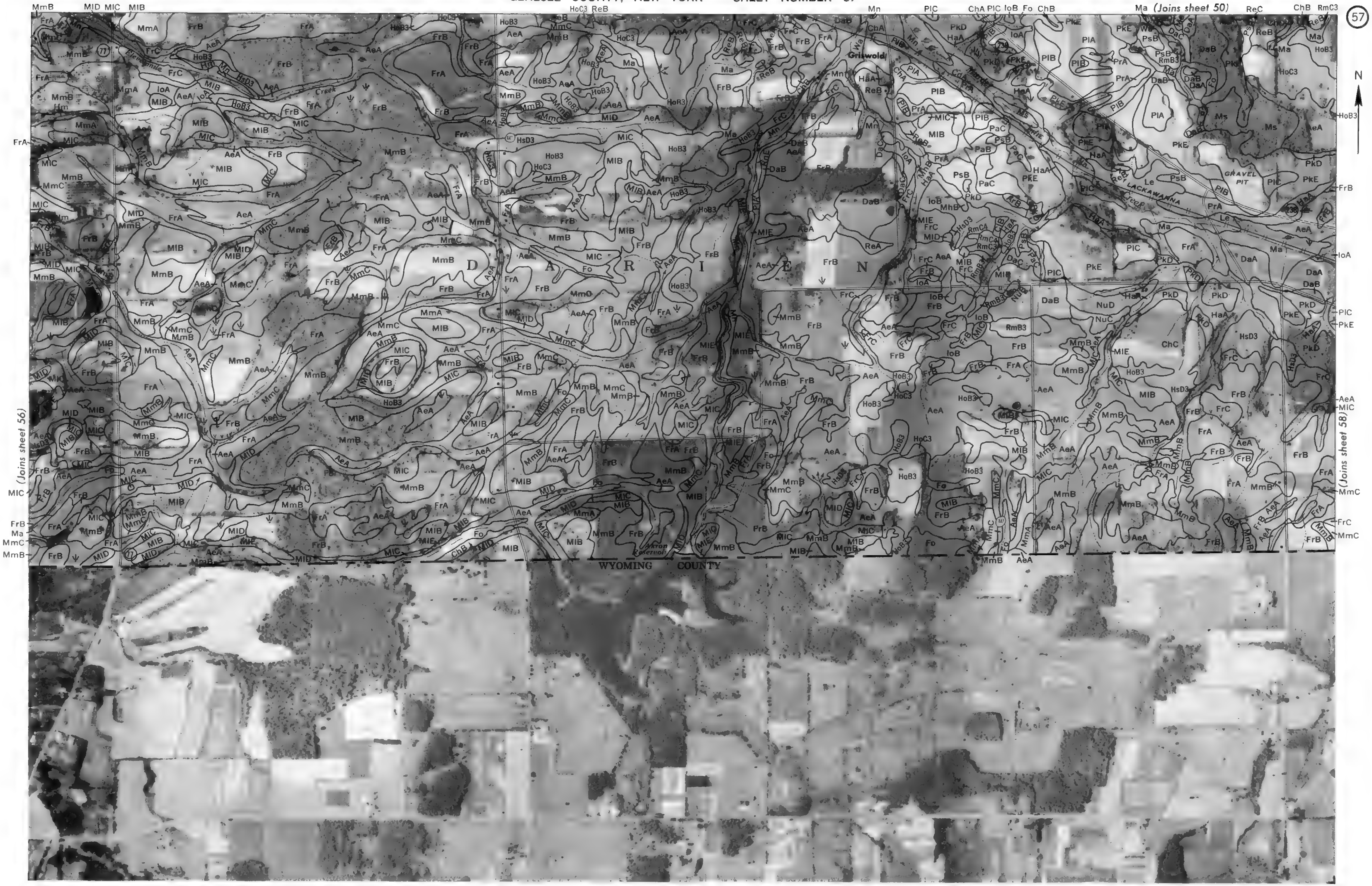
GENESEE COUNTY, NEW YORK — SHEET NUMBER 56

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 56

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK — SHEET NUMBER 57



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 57

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

(Joins sheet 51)

(Joins sheet 57)

(Joins sheet 59)

N

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 58

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

This map is one of a set compiled in 1957 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

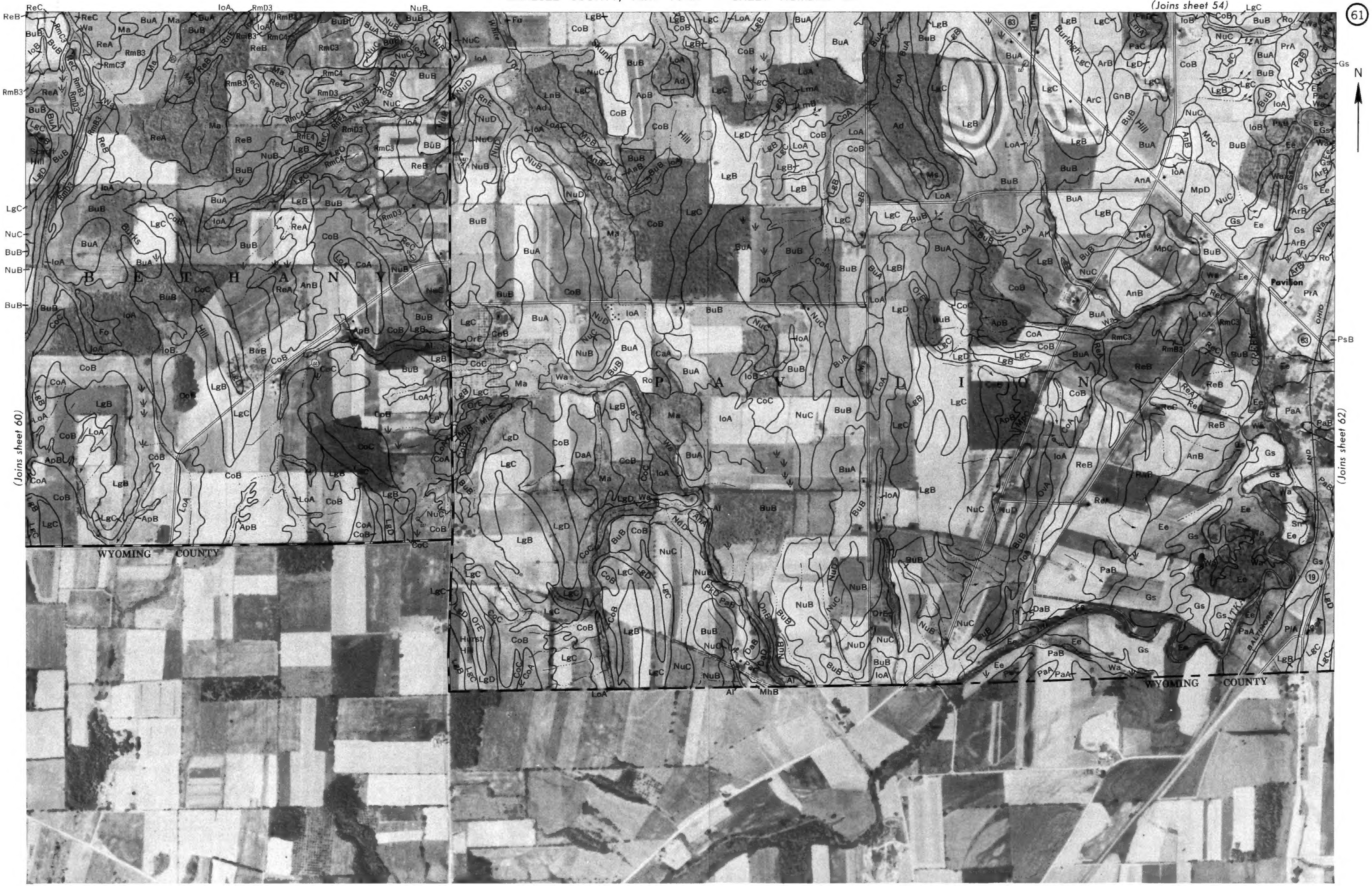
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK — SHEET NUMBER 60

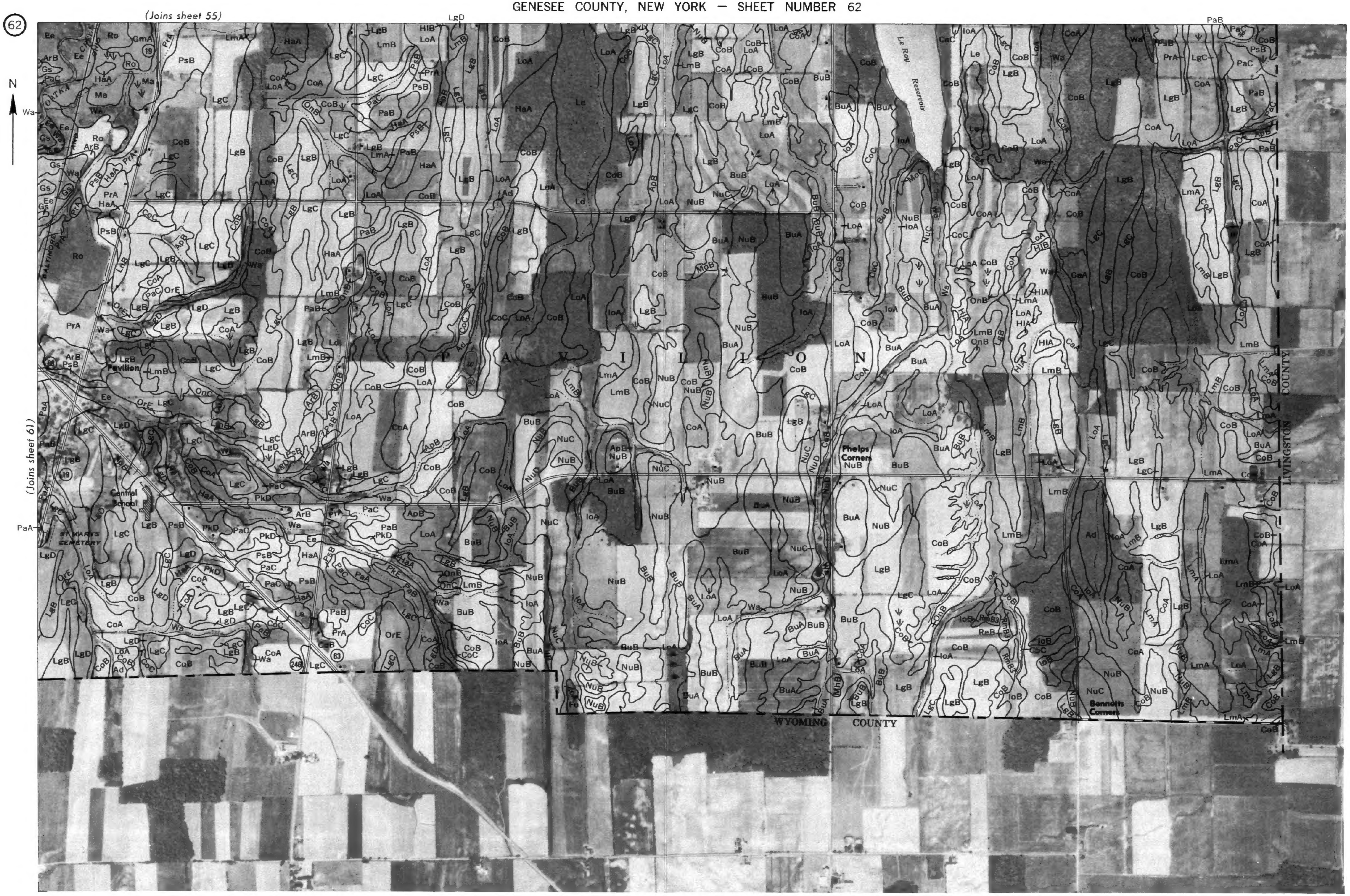
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 60

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

GENESEE COUNTY, NEW YORK NO. 62

This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Cornell University Agricultural Experiment Station.

GENESEE COUNTY, NEW YORK
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads

- Dual
- Good motor
- Poor motor
- Trail

Highway markers

- National Interstate
- U. S.
- State or county

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail, foot
- Railroad
- Ferry — FY
- Ford — FORD
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings

- School
- Church
- Station

Mines and Quarries

Mine dump

Pits, gravel or other

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line

- Perennial
- Intermittent

Streams, single-line

- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches — CANAL

Lakes and ponds

- Perennial — water — w
- Intermittent

Wells, water — flowing

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments

- Bedrock
- Other

Prominent peak

Depressions — Large — Small

- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Gravel
- Stony, very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully